

312/ E

DRINKING WATER SURVEILLANCE PROGRAM

**MANITOUWADGE
WELL SUPPLY**

REPORT FOR 1991 AND 1992

1991/1992 District Contacts for Northwest Ontario

District contacts

Don Murray/Jim Murphy
(807) 475-1670
Thunder Bay District Office

DWSP study

Atikokan
Beardmore
Manitouwadge
Marathon
Nipigon
Red Rock
Terrace Bay
Thunder Bay (Bare Point)
Thunder Bay (Loch Lomond)

Peter Fox/John Barr
(807) 468-2725
Kenora District Office

Dryden
Emo
Fort Frances
Kenora
Rainy River

1991/1992 District Contacts for Northeast Ontario

District contacts

DWSP study

Gerry LaHaye
(705) 949-4640
Sault Ste. Marie
District Office

Chapleau
Sault Ste Marie

Frank Driscoll
(705) 476-1001
North Bay District Office

North Bay

Roger Roy
(705) 670-3214
Sudbury District Office

Sudbury

ISSN 1195-1168

**MANITOUWADGE WELL SUPPLY
DRINKING WATER SURVEILLANCE PROGRAM
REPORT FOR 1991 AND 1992**

JUNE 1994



Cette publication technique
n'est disponible qu'en anglais.

Copyright: Queen's Printer for Ontario, 1994
This publication may be reproduced for non-commercial purposes
with appropriate attribution.

PIBS 3121

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

MANITOUWADGE WELL SUPPLY 1991 AND 1992 REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

The Manitouwadge well supply has a groundwater source. Wells 1 and 2 are located adjacent to the reservoir. Wells 3, 4 and 5 are located approximately one kilometer from the reservoir. Raw water from the remote wells is pumped through a 250 mm diameter ductile iron water main directly to the reservoir. The raw water from all wells passes through two parallel aeration towers in which the water cascades down the baffled towers, mixes in the reservoir and is disinfected. This supply has a maximum pumping capacity of $13.2 \times 1000 \text{ m}^3/\text{day}$. The Manitouwadge well supply serves a population of approximately 4,500.

Raw water from 4 wells, treated water from the reservoir and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

Table A is a summary of all results by group.

The health related guideline for turbidity was exceeded in one treated water sample. The District Officer was notified. Operational staff reported the bacteriological quality at that time was good, indicating acceptable disinfection.

No other known health related guidelines were exceeded.

The Manitouwadge well supply, for the sample years 1991 and 1992, produced acceptable quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	WELL 1		WELL 2		WELL 3		WELL 4	
	RAW TESTS	POSITIVE %	RAW TESTS	POSITIVE %	RAW TESTS	POSITIVE %	RAW TESTS	POSITIVE %
BACTERIOLOGICAL	23	1	4	2	0	27	11	2
CHEMISTRY (FIELD)	23	23	100	2	100	26	100	2
CHEMISTRY (LABORATORY)	303	238	78	23	19	327	76	23
METALS	312	115	36	24	8	336	34	24
CHLOROAROMATICS	98	0	0	14	0	112	0	14
PESTICIDES AND PCB	261	0	0	35	0	295	0	35
PHENOLICS	13	1	7	1	0	13	7	1
POLYAROMATIC HYDROCARBONS	101	0	0	.	.	84	0	.
SPECIFIC PESTICIDES	2	0	0	.	.	2	0	.
VOLATILES	379	1	0	31	1	410	3	31
RADIONUCLIDES	14	4	28	.	.	14	5	.
TOTAL	1,529	383	132	30	1,646	416	132	30

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	RESERVOIR TREATED		DIST. SYSTEM WARBLER DR			
	TESTS	POSITIVE %POSITIVE	TESTS	POSITIVE %POSITIVE		
BACTERIOLOGICAL	33	5	15	35	8	22
CHEMISTRY (FIELD)	66	56	84	128	103	80
CHEMISTRY (LABORATORY)	336	262	77	567	504	88
METALS	336	123	36	621	278	44
CHLOROAROMATICS	112	0	0	112	0	0
PESTICIDES AND PCB	296	0	0	178	0	0
PHENOLICS	14	1	7	.	.	.
POLYAROMATIC HYDROCARBONS	67	0	0	84	0	0
SPECIFIC PESTICIDES	2	0	0	2	0	0
VOLATILES	410	42	10	410	42	10
RADIONUCLIDES	14	3	21	.	.	.
TOTAL	1,686	492		2,137	935	

DRINKING WATER SURVEILLANCE PROGRAM

MANITOUWADGE WELL SUPPLY 1991 AND 1992 REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Manitouwadge well supply in January 1991. This is the first published DWSP report.

PLANT DESCRIPTION

The Manitouwadge well supply has a groundwater source. Wells 1 and 2 are located adjacent to the reservoir. Wells 3, 4 and 5 are located approximately one kilometer from the reservoir. Raw water from the remote wells is pumped through a 250 mm diameter ductile iron water main directly to the reservoir. The raw water from all wells passes through two parallel aeration towers in which the water cascades down the baffled towers, mixes in the reservoir and is disinfected. This supply has a maximum pumping capacity of $13.2 \times 1000 \text{ m}^3/\text{day}$. The Manitouwadge well supply serves a population of approximately 4,500.

The sample day flows ranged from $1.8 \times 1000 \text{ m}^3/\text{day}$ to $4.6 \times 1000 \text{ m}^3/\text{day}$.

General information for the water supply is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Stringent DWSP sampling protocols were followed to ensure that all samples were collected in a uniform manner (see Appendix B).

Sample lines at the wells and the reservoir were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

Supply operating personnel routinely analyzed parameters for process control (see Table 2 if data is provided).

At all distribution system locations, two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples, therefore, were laboratory chemistry and metals. The free flow sample represented fresh water from the distribution system main, since the sample tap was flushed for five minutes prior to sampling.

Raw water from 4 wells, treated water from the reservoir and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 (when data is provided) contains information on flow rate and treatment chemicals dosages.

Table 4 is a summary of all results by parameter and by water type. If a parameter was not detected, the total number of negative sample results is given. In contrast, if a parameter was detected at any location, the detailed results for all samples are provided.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment and Energy laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 4 and 5. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

The guidelines are evaluated on the results from the free flowing samples. Standing samples in the distribution system can show elevated concentrations in certain metals if the water is corrosive or if the standing time is excessive. Flushing the tap until the water achieves the coolest temperature will ensure that the water used for consumption will contain minimum concentrations of metals.

IN REPORTS FOR GROUND WATER SUPPLIES, WHERE:

- TREATMENT CAN BE LIMITED TO DISINFECTION;
- MANY WELLS CAN FEED INTO THE DISTRIBUTION SYSTEM INDEPENDENTLY; AND
- TREATED SAMPLES, WHEN AVAILABLE, ARE TAKEN FROM RESERVOIRS;

THIS SECTION WILL DISCUSS:

- RESULTS FROM RAW, TREATED AND DISTRIBUTED WATERS;
- THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND
- POSITIVE ORGANIC PARAMETERS DETECTED.

In this report comments are combined for all sample locations for each parameter discussed.

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples. Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (LABORATORY)

Calcium exceeded the European Economic Community Aesthetic Guideline Level of 100 mg/L in 5 of 28 treated and distributed water samples with a maximum reported value of 118.1 mg/L.

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions. Colour is measured in Hazen units (HZU).

Colour exceeded the ODWO Aesthetic Objective of 5 HZU in 1 of 28 treated and distributed water samples with a maximum reported value of 6.0 HZU.

Elevated conductivity is often associated with high hardness levels.

Conductivity exceeded the European Economic Community Aesthetic Guideline Level of 400 umho/cm in all 28 treated and distributed water samples with a maximum reported value of 808 umho/cm.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Recommended Operational Guideline of 80-100 mg/L and also exceeded 200 mg/L in all 28 treated and distributed water samples with a maximum reported value of 389 mg/L.

Dissolved solids exceeded the ODWO Aesthetic Objective of 500 mg/L in 1 of 28 treated and distributed water samples with a maximum reported value of 520 mg/L.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO Maximum Acceptable Concentration for turbidity is 1.0 Formazin Turbidity Unit (FTU).

Turbidity exceeded the ODWO Maximum Acceptable Concentration of 1.0 FTU in 1 of 14 treated water samples with a maximum reported value of 5.7 FTU. The corresponding and more reliable field turbidity results were not reported. In ground water samples, turbidity can increase if the samples are not analyzed immediately in the field. This is frequently caused by precipitating iron and manganese but can also be due to precipitates formed from sulphides or calcium. The District Officer was advised of the situation.

METALS

Manganese, in high concentrations, can contribute to laundry staining and undesirable tastes.

Manganese exceeded the ODWO Aesthetic Objective of 50.0 ug/L in 13 of 28 treated and distributed water samples with a maximum reported value of 750 ug/L.

The numerous minerals and salts detected above aesthetic guidelines is characteristic of many groundwater sources.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected.

CHLOROPHENOLS

The chlorophenol scan was not requested during this sampling period.

PESTICIDES AND PCB

The results of the pesticide and PCB scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs have been revised to replace the phenolic aesthetic objective with objectives for specific phenols.

Phenolics was found at a positive level in 1 of the 14 treated water samples analyzed. The maximum observed level was 1.4 ug/L.

POLYAROMATIC HYDROCARBONS

The results of the polyaromatic hydrocarbon scan showed that none were detected.

SPECIFIC PESTICIDES

The specific pesticide scan was not requested during this sampling period.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology. Trace levels of styrene are considered to be laboratory artifacts resulting from the sample shipping containers.

Tetrachloroethylene was found at positive levels in 2 of 28 treated and distributed water samples analyzed. The maximum observed level was 0.9 ug/L. This was below the ODWO Health Related Guidance Value of 65 ug/L.

Tetrachloroethylene was detected at positive levels in all 14 raw water samples from well 3. The maximum observed level was 5.4 ug/L.

Trichloroethylene was detected at low trace levels in 8 of 14 raw water samples from one well.

1,1,1-Trichloroethane was detected at positive levels in 2 raw water samples from well 1. Trace levels were detected in most sample sites. The maximum observed level was 0.46 ug/L. The US Environmental Protection Agency (EPA) has a Maximum Contaminant Level of 200 ug/L.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THM results are discussed. Starting in 1991, samples from the distribution system were quenched with sodium thiosulphate to stop the further production of THMs in the sample bottle. This provided a more representative estimation of the THMs consumed in tap water.

Total trihalomethanes were found at positive levels in 24 of 28 treated and distributed water samples analyzed. The maximum observed level was 48.1 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

Chloroform was detected at trace levels in 9 of 13 raw water samples from one well. It was not evident that backmixing of chlorine had occurred when the raw water samples were taken and it suggests that chloroform may be present at trace levels in the raw water source. However, the pump at this location is lubricated with treated chlorinated water which contains chloroform.

RADIOLOGICAL

RADIONUCLIDES

There are more than 200 radionuclides, some of which occur naturally and others which originate from the activities of society. The radionuclides currently of greater interest from a health view-point are tritium, strontium-90, iodine-131, cesium-137 and radium-226. The gross beta and gross alpha determinations are suitable for preliminary screening except for tritium which must be measured separately. Radionuclides are measured in becquerels per litre (Bq/L). No results were above the available guidelines.

CONCLUSIONS

The health related guideline for turbidity was exceeded in one treated water sample. In groundwater supplies turbidity can increase in the sample due to precipitation of iron and manganese. The District Officer was advised to check the bacteriological results in the treated and distributed water to ensure there was adequate disinfection. Operational staff reported the bacteriological quality at that time was good, indicating acceptable disinfection.

No other known health related guidelines were exceeded.

The Manitouwadge well supply, for the sample years 1991 and 1992, produced acceptable quality water and this was maintained in the distribution system.

TABLE 1
DRINKING WATER SURVEILLANCE PROGRAM
PLANT GENERAL REPORT

PLANT NAME: MANITOUWADGE WELL SUPPLY
WORKS #: 220000219
UTM #: 165384545373961

DISTRICT: THUNDER BAY
REGION: NORTHWEST
DISTRICT OFFICER: D.W. MURRAY

SUPERINTENDENT: OSMO KANKKUNEN

ADDRESS: MANITOU RD.
MANITOUWADGE, ONTARIO
POT 2C0
807-826-3227 (EXT. 226)

MUNICIPALITY: MANITOUWADGE
AUTHORITY: MUNICIPAL

PLANT INFORMATION

MAXIMUM PUMPING CAPACITY: 13.200 (X 1000 M3/DAY)
RATED CAPACITY: 10.560 (X 1000 M3/DAY)

MUNICIPALITY	POPULATION
-----	-----
MANITOUWADGE	4,500

TABLE 3
 DRINKING WATER SURVEILLANCE PROGRAM MANITOQUADGE WELL SUPPLY SAMPLE DAY CONDITIONS
 AND TREATMENT CHEMICAL DOSAGES IN (MG/L) FOR 1991 AND 1992

DATE	DELAY * TIME(HRS)	FLOW (1000M3)	POST CHLORINATION SODIUM HYPOCHLORITE	
91 FEB 13	.00	2.841	.78	
91 MAY 28	.00	2.736	1.06	
91 JUN 25	.00	4.536	1.42	
91 JUL 23	.00	3.528	1.02	
91 AUG 13	.00	4.608	1.02	
91 SEP 24	.00	3.168	1.63	
91 OCT 22	.00	3.528	2.03	
92 JAN 28	.00	3.168	1.40	
92 MAY 05	.00	3.600	1.40	
92 JUL 28	.00	1.872	1.43	

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

KEY TO TABLE 4 and 5

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
 - 1+. MAC for Total Trihalomethanes
 2. Interim Maximum Acceptable Concentration (IMAC)
 3. Aesthetic Objective (AO)
 - 3*. AO for Total Xylenes
 4. Recommended Operational Guideline
 5. Health Related Guidance Value
- B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
 2. Proposed MAC
 3. Interim MAC
 4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
 2. Tentative GV
 3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
 2. Suggested No-Adverse Effect Level (SNAEL)
 3. Lifetime Health Advisory
 4. EPA Ambient Water Quality Criteria
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
 2. Aesthetic Guideline Level
 3. Maximum Admissable Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!48	No Data: Sample Age Exceeded 48 Hours
!AR	No Data: No Numeric Results
!AW	No Data: Analysis Withdrawn
!BT	No Data: Sample Broken In Transit
!CS	No Data: Contamination Suspected
!EF	No Data: Laboratory Equipment Failure
!IR	No Data: Insufficient Sample
!IS	No Data: Insufficient Sample
!LA	No Data: Laboratory Accident
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!PE	No Data: Procedure Error: Sample Discarded
!PR	No Data: Preservative Required
!QU	No Data: Quality Control Unacceptable
!RE	No Data: Received Empty
!RO	No Data: No Numeric Results
!SM	No Data: Sample Missing
!SS	No Data: Sample Improperly Preserved
!U	No Data: Sample Unsuitable For Analysis
!UB	No Data: Bottle Broken
!UN	No Data: Result Unreliable

!UR	No Data: Unpreserved Sample Required
A	Approximate Value
A3C	Approximate, Total Count Exceeded 300 Colonies
A>	Approximate Value, Exceeded Normal Range
APS	Additional Peak, Less Than, Not Priority Pollutant
ARO	Additional Information In Laboratory Report
CRO	Calculated Result Only
NAF	Not All Required Tests Found
RID	Ioncal Calculated on Incomplete Data Set
RMP	P and M-Xylene Not Separated
RRR	Result Obtained by Repeat Analysis
RRV	Rerun Verification
SFA	Sample Filtered: Filtrate Analyzed
SIL	Sample Incorrectly Labelled
SPS	Several Peaks, Small, Not Priority Pollutant
U48	Unreliable: Sample Age Exceeded 48 Hours
UAL	Unreliable: Sample Age Exceeded Limit
UAU	Unreliable: Sample Age Unknown
UCS	Unreliable: Contamination Suspected
USD	Unreliable: Sample Decomposition Noted
WSD	Wrong Sample Description On Bottle

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
BACTERIOLOGICAL						
FECAL COLIFORM MF (CT/100ML)	DET'N LIMIT = 0			GUIDELINE = 0 (A1)		
20 SAMPLES	BDL	BDL	BDL	BDL	.	.
TOTAL COLIFORM MF (CT/100ML)	DET'N LIMIT = 0			GUIDELINE = 5/100ML (A1)		
20 SAMPLES	BDL	BDL	BDL	BDL	.	.
STANDRD PLATE CNT MF (CT/ML)	DET'N LIMIT = 0			GUIDELINE = 500 (A3)		
1991 JAN	.	.	.	5	6	.
1991 FEB	.	.	.	2	36	.
1991 APR	.	.	.	2	4	.
1991 JUN	1	42	.	0	5	.
1991 JUL	.	69	.	15	3	.
1991 AUG	.	.	.	ICS	3	.
1991 SEP	.	.	.	0	0	.
1991 OCT	.	.	.	0	7	.
1991 NOV	.	.	.	ICS	ICS	.
1992 JAN	.	.	.	0	0	.
1992 MAY	.	.	.	3	2	.
1992 JUL	.	.	.	ICS	0	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUBADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
CHEMISTRY (FIELD)						
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A		
1991 JAN900	.000	.
1991 FEB000	.000	.000
1991 APR000	.000	.000
1991 APR000	.000	.000
1991 JUN000	.000	.000
1991 JUL000	.000	.000
1991 AUG000	.000	.000
1991 SEP000	.000	.000
1991 OCT000	.000	.000
1991 NOV000	.000	.000
1992 JAN000	.000	.000
1992 MAY200	.200	.200
1992 JUL200
FLD CHLORINE FREE (MG/L)						
		DET'N LIMIT = 0		GUIDELINE = N/A		
1991 JAN300	.200	.
1991 FEB200	.200	.200
1991 APR200	.200	.200
1991 APR200	.200	.200
1991 MAY400	.200	.200
1991 JUN800	.000	.000
1991 JUL400	.200	.200
1991 AUG400	.200	.200
1991 SEP800	.200	.200
1991 OCT	.	.	.	1.200	.200	.200
1991 NOV200	.200	.200
1992 JAN400	.200	.200
1992 MAY200	.200	.200
1992 JUL200	.	.200
FLD CHLORINE (TOTAL) (MG/L)						
		DET'N LIMIT = 0		GUIDELINE = N/A		
1991 JAN	.	.	.	1.200	.200	.
1991 FEB200	.200	.200
1991 APR200	.200	.200
1991 APR200	.200	.200
1991 MAY400	.200	.200
1991 JUN800	.000	.000
1991 JUL400	.200	.200
1991 AUG400	.200	.200
1991 SEP800	.200	.200
1991 OCT	.	.	.	1.200	.200	.200
1991 NOV200	.200	.200
1992 JAN400	.200	.200
1992 MAY400	.400	.400
1992 JUL200	.	.400

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
CHEMISTRY (FIELD)						
FLD PH (DMNSLESS)	DET'N LIMIT = N/A			GUIDELINE = 6.5-8.5 (A4)		
1991 JAN	7.000	7.200	7.600	7.600	7.600	7.600
1991 FEB	7.000	7.000	7.600	7.600	7.600	7.600
1991 APR	7.000	7.200	7.400	7.400	7.400	7.800
1991 APR	7.000	7.200	7.400	7.400	7.400	7.400
1991 MAY	7.000	7.200	7.600	7.600	7.600	7.600
1991 JUN	7.000	7.400	7.600	7.600	7.600	7.600
1991 JUL	7.600	7.200	7.600	7.600	7.600	7.600
1991 AUG	7.200	7.400	7.600	7.600	7.600	7.600
1991 SEP	7.200	7.200	7.400	7.400	7.400	7.400
1991 OCT	7.200	7.400	7.400	7.400	7.400	7.400
1991 NOV	7.600	7.400	7.600	7.600	7.600	7.600
1992 JAN	7.400	7.400	7.600	7.600	7.600	7.600
1992 MAY	7.000	7.200	7.600	7.600	7.600	7.600
1992 JUL	7.200	7.200	7.400	7.600	7.600	7.600
FLD TEMPERATURE (DEG.C)						
DET'N LIMIT = N/A			GUIDELINE = 15 (A3)			
1991 JAN	4.000	6.000	5.500	4.500	4.500	6.000
1991 FEB	4.000	4.000	6.000	4.500	4.500	7.000
1991 APR	7.000	5.000	5.000	3.500	3.500	8.500
1991 APR	5.000	5.000	5.000	5.000	5.000	5.000
1991 MAY	6.000	6.000	6.000	8.000	8.000	8.000
1991 JUN	6.000	6.000	11.000	11.000	11.000	11.000
1991 JUL	11.000	6.000	6.000	11.000	11.000	11.000
1991 AUG	6.000	7.000	6.000	11.000	11.000	11.000
1991 SEP	7.000	8.000	7.000	9.000	9.000	9.000
1991 OCT	7.000	7.000	7.000	8.000	8.000	8.000
1991 NOV	7.000	8.000	6.000	8.000	8.000	8.000
1992 JAN	6.000	6.000	6.000	6.000	6.000	6.000
1992 MAY	5.000	5.000	5.000	5.000	5.000	5.000
1992 JUL	5.000	5.000	5.000	5.000	5.000	5.000

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOQUADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
CHEMISTRY (LABORATORY)						
ALKALINITY (MG/L)						
DET'N LIMIT = 0.2			GUIDELINE = 30-500 (A4)			
1991 JAN	305.700	270.600	.	250.500	252.400	243.100
1991 FEB	368.700	328.700	.	255.000	246.100	226.400
1991 APR	226.900	251.400	.	207.900	238.000	205.300
1991 APR	344.200	171.500	.	228.600	220.300	235.800
1991 MAY	318.500	210.300	.	258.700	232.500	233.400
1991 JUN	238.000	198.300	.	200.500	217.700	221.600
1991 JUL	342.300	206.000	.	205.000	221.300	236.700
1991 AUG	273.500	243.600	.	281.300	236.600	245.800
1991 SEP	301.200	251.300	.	231.900	248.400	243.600
1991 OCT	323.100	254.700	.	259.300	242.700	251.500
1991 NOV	283.500	225.000	.	248.000	253.900	252.400
1992 JAN	288.500	234.600	.	246.800	252.500	196.600
1992 MAY	411.400	198.500	.	209.100	195.800	276.000
1992 JUL	287.200	257.300	237.400	248.300	289.700	
CALCIUM (MG/L)						
DET'N LIMIT = 0.20			GUIDELINE = 100 (F2)			
1991 JAN	99.440	97.500	.	91.700	95.950	98.500
1991 FEB	115	115	.	91.700	94.700	94.000
1991 APR	99.800	85.600	.	91.000	98.200	86.000
1991 APR	124.800	68.000	.	84.000	84.000	95.000
1991 MAY	110.000	90.600	.	100.000	94.200	93.800
1991 JUN	80.200	80.400	.	81.400	88.600	90.000
1991 JUL	116.000	88.400	.	84.400	90.400	98.400
1991 AUG	94.200	98.400	.	105.000	94.400	101.300
1991 SEP	100.400	99.600	.	92.300	99.900	98.200
1991 OCT	108.300	92.000	.	96.600	97.400	102.300
1991 NOV	117.700	98.800	.	104.000	105.400	104.900
1992 JAN	78.400	91.200	.	90.100	96.800	81.400
1992 MAY	135.100	88.000	.	85.100	82.700	112.000
1992 JUL	125.600	109.100	100.800	107.600	118.100	
CYANIDE (MG/L)						
DET'N LIMIT = 0.001			GUIDELINE = 0.2 (A1)			
36 SAMPLES	BDL	BDL	ISM	BDL	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUBADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
CHLORIDE (MG/L)	CHEMISTRY (LABORATORY)						
			DET'N LIMIT = 0.20		GUIDELINE = 250 (A3)		
1991 JAN	61.000	.	69.900	.	47.500	36.200	.
1991 FEB	59.600	.	68.900	.	52.100	36.300	35.700
1991 APR	56.100	.	30.400	.	32.100	28.000	25.400
1991 APR	56.300	.	8.700	.	33.900	22.800	18.200
1991 MAY	59.600	.	18.700	.	39.400	31.100	31.300
1991 JUN	60.200	.	14.700	.	20.400	25.700	30.300
1991 JUL	60.600	.	18.400	.	20.600	27.500	26.800
1991 AUG	62.700	.	34.500	.	50.900	31.800	30.400
1991 SEP	69.300	.	51.200	.	36.400	39.800	38.700
1991 OCT	70.200	.	41.900	.	52.200	39.000	38.200
1991 NOV	82.600	.	35.000	.	36.800	40.700	38.700
1992 JAN	79.300	.	36.900	.	30.300	48.400	43.800
1992 MAY	65.400	.	18.000	.	18.300	16.900	15.800
1992 JUL	.	90.300	46.900	35.600	44.700	63.100	54.200
COLOUR (HZU)	DET'N LIMIT = 0.50						
			GUIDELINE = 5 (A3)				
1991 JAN	3.000	.	1.500 <T	.	2.000 <T	2.500	.
1991 FEB	2.000 <T	.	.500 <T	.	2.000 <T	1.500 <T	.500 <T
1991 APR	4.000	.	2.500	.	3.500	3.000	3.000
1991 APR	3.500	.	80L	.	3.000	1.500 <T	1.500 <T
1991 MAY	4.500	.	3.000	.	4.000	4.000	4.000
1991 JUN	3.000	.	2.000	.	3.000	3.000	1.000 <T
1991 JUL	4.000	.	2.000	.	3.500	3.000	3.000
1991 AUG	3.500	.	1.500	.	3.000	2.000	1.500
1991 SEP	4.500	.	2.500	.	3.500	3.500	3.000
1991 OCT	4.000	.	2.000	.	3.000	2.000	1.000 <T
1991 NOV	2.500	.	3.000	.	3.500	2.500	1.000 <T
1992 JAN	3.000	.	3.000	.	3.000	2.500	1.000 <T
1992 MAY	5.500	.	3.000	.	6.000	4.500	3.500
1992 JUL	.	11.000	3.000	3.500	2.500	2.500	2.500

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

CHEMISTRY (LABORATORY)						
WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
CONDUCTIVITY (UMHO/CM)						
DET'N LIMIT = 1.0				GUIDELINE = 400 (F2)		
1991 JAN	847	.	864	.	711	643
1991 FEB	835	.	848	.	740	635
1991 APR	795	.	621	.	615	592
1991 APR	770	.	483	.	607	538
1991 MAY	774	.	547	.	627	571
1991 JUN	835	.	552	.	534	579
1991 JUL	838	.	570	.	544	582
1991 AUG	834	.	653	.	736	614
1991 SEP	884	.	761	.	636	671
1991 OCT	897	.	709	.	746	652
1991 NOV	826	.	624	.	657	674
1992 JAN	844	.	652	.	678	715
1992 MAY	878	.	540	.	526	514
1992 JUL	.	862	720	648	701	800
DISS ORG CARBON (MG/L)						
DET'N LIMIT = 0.10				GUIDELINE = 5.0 (A3)		
1991 JAN	3.100	.	2.100	.	2.300	2.300
1991 FEB	3.200	.	2.400	.	2.500	2.200
1991 APR	3.300	.	2.100	.	2.900	2.700
1991 APR	3.100	.	2.100	.	2.800	2.700
1991 MAY	2.900	.	1.900	.	2.500	2.700
1991 JUN	2.800	.	2.000	.	2.700	2.500
1991 JUL	3.100	.	2.000	.	3.400	2.900
1991 AUG	3.800	.	2.300	.	3.100	2.900
1991 SEP	3.200	.	2.000	.	2.600	2.700
1991 OCT	3.300	.	1.800	.	2.600	2.600
1991 NOV	2.400	.	2.100	.	2.300	2.500
1992 JAN	2.100	.	2.100	.	2.300	2.300
1992 MAY	4.300	.	2.200	.	3.500	2.900
1992 JUL	.	2.300	2.100	2.100	2.200	2.300

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUBADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WABLER OR FREE FLOW	DIST. SYSTEM WABLER OR STANDING
CHEMISTRY (LABORATORY)						
DET'N LIMIT = 0.01						
GUIDELINE = 1.5 (A1)						
FLUORIDE (MG/L)						
1991 JAN	.060	.080	.100	.100	.100	.100
1991 FEB	.060	.100	.080	.080	.100	.100
1991 APR	.080	.100	.100	.100	.100	.120
1991 APR	.060	.120	.080	.080	.080	.100
1991 MAY	.040 <T	.120	.080	.080	.100	.100
1991 JUN	.060	.140	.100	.100	.100	.100
1991 JUL	.060	.140	.120	.120	.100	.100
1991 AUG	.060	.120	.080	.080	.100	.100
1991 SEP	.060	.100	.100	.100	.100	.100
1991 OCT	.060	.100	.080	.080	.100	.100
1991 NOV	.080	.120	.100	.100	.100	.100
1992 JAN	.080	.080	.040 <T	.080	.080	.080
1992 MAY	.080	.140	.120	.120	.140	.140
1992 JUL	.060	.120	.100	.060	.100	.100
DET'N LIMIT = 0.5						
GUIDELINE = 80-100 (A4)						
HARDNESS (MG/L)						
1991 JAN	352.000	348.000	310.000	313.000	318.700	
1991 FEB	352.000	348.000	314.000	310.700	318.700	
1991 APR	347.000	290.000	300.000	317.000	304.000	
1991 APR	408.600	233.000	283.000	275.000	278.000	
1991 MAY	368.000	295.000	323.000	302.000	305.000	
1991 JUN	298.000	270.000	266.000	288.000	304.000	
1991 JUL	385.000	292.000	274.000	291.000	289.000	
1991 AUG	332.000	326.000	342.000	306.000	316.000	
1991 SEP	354.500	337.400	301.800	322.600	325.700	
1991 OCT	370.400	313.100	321.300	314.900	316.900	
1991 NOV	380.300	320.000	335.800	341.000	332.500	
1992 JAN	275.200	305.800	302.600	323.400	339.700	
1992 MAY	459.000	291.000	278.000	271.000	267.000	
1992 JUL	399.000	357.000	325.000	389.000	369.000	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

IONCAL (DMNSLESS)							
CHEMISTRY (LABORATORY)							
WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING	
DET'N LIMIT = N/A				GUIDELINE = N/A			
1991 JAN	3.865	.	.	.	7.031	3.811	
1991 FEB	.000 NAF	.	5.157	.	3.053 NAF	3.158 NAF	
1991 APR	17.760 NAF	.	.000 NAF	.	7.879 NAF	3.097 NAF	
1991 APR	.632 NAF	.	12.510 NAF	.	3.556 NAF	4.291 NAF	
1991 MAY	3.689	.	3.973 NAF	.	.379	1.272	
1991 JUN	3.356	.	1.190	.	.055	.226	
1991 JUL	6.030	.	3.714	.	.420	.694	
1991 AUG	2.749	.	1.247	.	4.132	1.516	
1991 SEP	3.893 NAF	.	2.088	.	3.251 NAF	1.194 NAF	
1991 OCT	4.442	.	4.088 NAF	.	3.863	1.511	
1991 NOV	2.390	.	4.382	.	1.498	.460	
1992 JAN	42.510	.	3.852	.	3.070	.824	
1992 MAY	3.294 NAF	.	3.652	.	.227 NAF	3.261 NAF	
1992 JUL	.	.548	.196	2.987	4.412	1.880	
1992 JUL	.	.	2.487	.	.	.	
DET'N LIMIT = 0.01				GUIDELINE = 10 (F2)			
POTASSIUM (MG/L)							
1991 JAN	2.180	.	2.730	.	2.180	1.930	
1991 FEB	11S	.	11S	.	2.270	2.080	
1991 APR	2.280	.	2.400	.	1.910	1.870	
1991 APR	2.500	.	1.950	.	1.950	1.950	
1991 MAY	2.300	.	2.100	.	2.000	1.900	
1991 JUN	2.550	.	2.200	.	1.750	2.050	
1991 JUL	2.350	.	2.200	.	1.800	1.950	
1991 AUG	2.400	.	1.950	.	2.300	2.050	
1991 SEP	2.340	.	2.350	.	2.100	1.980	
1991 OCT	2.480	.	2.330	.	1.900	2.070	
1991 NOV	2.340	.	2.420	.	2.210	1.970	
1992 JAN	2.050	.	1.970	.	1.830	2.200	
1992 MAY	2.470	.	2.090	.	2.090	1.710	
1992 JUL	.	2.620	1.950	.	1.610	2.270	
1992 JUL	.	.	2.060	1.730	2.000	2.150	

TABLE 4
ORINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
CHEMISTRY (LABORATORY)						
LANGELIERS INDEX (DMNSLESS)						
		DET'N LIMIT = N/A		GUIDELINE = N/A		
1991 JAN	.759	.807		1.084	1.041	
1991 FEB	.884			1.001	1.054	1.127
1991 APR	1.243	1.030		1.045	1.089	1.110
1991 MAY	1.035	.955		1.052	1.053	.985
1991 JUN	.908	.837		1.150	1.093	1.173
1991 JUL	1.186	.983		1.019	1.027	1.179
1991 AUG	1.048	1.076		1.093	1.132	1.161
1991 SEP	1.115	1.129		1.252	1.157	1.206
1991 OCT	1.058	.953		1.247	1.240	1.232
1991 NOV	1.321	1.254		1.140	1.150	1.205
1992 JAN	1.101	1.226		1.377	1.453	1.536
1992 MAY	1.360	1.018		1.282	1.361	1.367
1992 JUL		1.211	1.175	1.127	1.047	1.103
				1.211	1.273	1.401
MAGNESIUM (MG/L)						
		DET'N LIMIT = 0.1		GUIDELINE = 30.0 (F2)		
1991 JAN	25.100	25.430		19.790	17.950	
1991 FEB	115	115		20.650	18.000	17.600
1991 APR	23.700	18.600		17.600	17.500	16.800
1991 APR	23.600	15.300		17.800	15.800	15.300
1991 MAY	22.600	16.800		17.800	16.400	16.500
1991 JUN	23.800	16.900		15.300	16.200	16.900
1991 JUL	23.500	17.300		15.300	15.900	15.800
1991 AUG	23.500	19.600		19.500	17.100	17.100
1991 SEP	25.250	21.550		19.250	17.750	17.700
1991 OCT	24.300	20.300		19.450	17.400	17.450
1991 NOV	21.000	17.850		18.500	18.950	18.750
1992 JAN	19.300	18.900		18.850	19.750	18.900
1992 MAY	29.500	17.300		15.900	15.600	15.600
1992 JUL		20.800	17.820	20.000	22.700	21.600

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
CHEMISTRY (LABORATORY)						
SODIUM (MG/L)	DET'N LIMIT = 0.20			GUIDELINE = 200 (A4)		
1991 JAN	23.600	24.700	18.200	15.600	15.100	
1991 FEB	11S	11S	20.300	15.000	12.600	
1991 APR	22.400	16.200	15.000	10.600	9.400	
1991 APR	22.300	6.600	17.400	14.600	14.600	
1991 MAY	23.400	10.600	10.200	12.200	13.600	
1991 JUN	22.400	7.800	10.200	12.200	12.600	
1991 JUL	22.800	8.200	19.400	14.000	13.200	
1991 AUG	23.800	13.600	14.000	16.200	16.300	
1991 SEP	25.200	16.500	21.200	16.300	16.300	
1991 OCT	26.500	14.500	14.400	16.000	14.700	
1991 NOV	31.700	14.200	18.100	20.300	18.600	
1992 JAN	17.650	16.000	9.450	8.530	8.460	
1992 MAY	37.100	9.560	15.100	26.000	22.600	
1992 JUL		18.800				
AMMONIUM TOTAL (MG/L)						
DET'N LIMIT = 0.002			GUIDELINE = 0.05 (F2)			
1991 JAN	BDL	BDL	BDL	.006 <T	.010	
1991 FEB	BDL	BDL	.004 <T	.002 <T	.010	
1991 APR	.018	BDL	.006 <T	.004 <T	.006 <T	
1991 APR	.004 <T	BDL	.004 <T	.002 <T	.006 <T	
1991 MAY	.002 <T	.002 <T	.002 <T	.008 <T	.006 <T	
1991 JUN	.002 <T	.002 <T	.004 <T	.004 <T	.004 <T	
1991 JUL	BDL	BDL	BDL	BDL	BDL	
1991 AUG	BDL	BDL	BDL	BDL	BDL	
1991 SEP	BDL	BDL	BDL	BDL	BDL	
1991 OCT	BDL	BDL	.002 <T	BDL	.002 <T	
1991 NOV	.002 <T	BDL	.004 <T	.004 <T	.012	
1992 JAN	.002 <T	BDL	.014	.008 <T	.006 <T	
1992 MAY	.002 <T	BDL	.004 <T	BDL	.004 <T	
1992 JUL						

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUBADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
CHEMISTRY (LABORATORY)						
NITRITE (MG/L)						
DET'N LIMIT = 0.001						
GUIDELINE = 1.0 (A1)						
1991 JAN	.001 <T	BDL		.001 <T	BDL	.001 <T
1991 FEB	.001 <T	BDL		BDL	BDL	.001 <T
1991 APR	.001 <T	.001 <T		BDL	BDL	.001 <T
1991 APR	.001 <T	BDL		BDL	BDL	.001 <T
1991 MAY	.002 <T	.001 <T		.001 <T	.001 <T	.001 <T
1991 JUN	.002 <T	.001 <T		.001 <T	.001 <T	.001 <T
1991 JUL	.002 <T	BDL		BDL	BDL	.002 <T
1991 AUG	.001 <T	.001 <T		BDL	BDL	.001 <T
1991 SEP	.003 <T	.001 <T		BDL	BDL	BDL
1991 OCT	.002 <T	BDL		BDL	BDL	BDL
1991 NOV	.002 <T	.002 <T		.001 <T	.001 <T	.002 <T
1992 JAN	.003 <T	.003 <T		.002 <T	.002 <T	.003 <T
1992 MAY	.008	.001 <T		.002 <T	.001 <T	.001 <T
1992 JUL	.002 <T	.003 <T	.002 <T	.002 <T	.003 <T	.002 <T
NITRATE (TOTAL) (MG/L)						
DET'N LIMIT = 0.005						
GUIDELINE = 10.0 (A1)						
1991 JAN	1.040	1.210		.940	.820	.760
1991 FEB	.920	1.070		.915	.765	.415
1991 APR	1.080	.125		.575	.505	.210
1991 APR	1.100	BDL		.645	.335	.565
1991 MAY	1.120	.070		.760	.555	.630
1991 JUN	1.100	.030		.430	.485	.530
1991 JUL	1.100	.040		.405	.535	.595
1991 AUG	1.120	.210		1.100	.580	.710
1991 SEP	.915	.340		.680	.740	.720
1991 OCT	1.070	.310		1.040	.725	.870
1991 NOV	1.750	.800		.815	.875	.945
1992 JAN	2.020	.820		.880	1.020	.180
1992 MAY	.575	.080		.275	.200	1.040
1992 JUL		.930	1.520	1.060	1.070	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 PAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
CHEMISTRY (LABORATORY)						
NITROGEN TOT KJELD (MG/L)						
		DET'N LIMIT = 0.02		GUIDELINE = N/A		
1991 JAN	.170	.130	.	.210	.130	.
1991 FEB	.180	.130	.	.160	.100	.240
1991 APR	.160	.090 <T	.	.100	.090 <T	.170
1991 APR	.150	.070 <T	.	.150	.080 <T	.360
1991 MAY	.200	.090 <T	.	.170	.130	.280
1991 JUN	.080 <T	.070 <T	.	.090 <T	.100	.110
1991 JUL	.180	.180	.	.110	.120	.190
1991 AUG	.190	.110	.	.180	.140	.160
1991 SEP	.210	.110	.	.100	.120	.170
1991 OCT	.160	.090 <T	.	.150	.110	.130
1991 NOV	.280	.130	.	.140	.130	.170
1992 JAN	.170	.150	.	.200	.150	.230
1992 MAY	.200	.120	.	.180	.160	.170
1992 JUL	.180	.130	.170	.120	.110	.140
PH (OMNSLESS)						
		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5 (A4)		
1991 JAN	7.760	7.870	.	8.200	8.130	.
1991 FEB	8.100	7.990	.	8.110	8.160	8.220
1991 APR	8.010	8.170	.	8.240	8.190	8.250
1991 APR	8.090	8.200	.	8.240	8.250	8.200
1991 MAY	7.970	8.140	.	8.210	8.220	8.290
1991 JUN	8.110	8.100	.	8.270	8.210	8.310
1991 JUL	8.070	8.190	.	8.320	8.330	8.330
1991 AUG	8.120	8.170	.	8.260	8.280	8.310
1991 SEP	8.120	8.210	.	8.390	8.320	8.310
1991 OCT	8.000	8.060	.	8.220	8.250	8.300
1991 NOV	8.280	8.380	.	8.440	8.500	8.600
1992 JAN	8.230	8.370	.	8.410	8.450	8.420
1992 MAY	8.100	8.240	.	8.340	8.300	8.360
1992 JUL	.	8.050	8.270	8.260	8.220	8.390

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
---------------	---------------	---------------	---------------	----------------------	---	--

CHEMISTRY (LABORATORY)

GUIDELINE = N/A

DET'N LIMIT = 0.0005

)

PHOSPHORUS FIL REACT (MG/L)

1991 JAN	.001 <T	.	BDL	.001 <T	.	.
1991 FEB	.001 <T	.	.000 <T	.000 <T	.	.
1991 APR	.000 <T	.	BDL	.001 <T	.	.
1991 APR	.000 <T	.	BDL	.001 <T	.	.
1991 MAY	.000 <T	.	.000 <T	.001 <T	.	.
1991 JUN	.000 <T	.	BDL	.001 <T	.	.
1991 JUN	BDL	.	BDL	.001 <T	.	.
1991 AUG	.000 <T	.	BDL	.000 <T	.	.
1991 SEP	.000 <T	.	.000 <T	.001 <T	.	.
1991 OCT	.001 <T	.	.000 <T	.001 <T	.	.
1991 NOV	BDL	.	BDL	BDL	.	.
1992 JAN	BDL	.	BDL	.001 <T	.	.
1992 MAY	BDL	.	BDL	BDL	.	.
1992 JUL	.	BDL	BDL	.001 <T	.	.

GUIDELINE = 0.40 (F2)

DET'N LIMIT = 0.002

)

PHOSPHORUS TOTAL (MG/L)

1991 JAN	BDL	.	BDL	.015	.	.
1991 FEB	.004 <T	.	.002 <T	BDL	.	.
1991 APR	BDL	.	BDL	BDL	.	.
1991 APR	.004 <T	.	BDL	.003 <T	.	.
1991 MAY	BDL	.	.002 <T	BDL	.	.
1991 JUN	BDL	.	BDL	BDL	.	.
1991 JUL	.002 <T	.	.007 <T	.003 <T	.	.
1991 AUG	BDL	.	.004 <T	BDL	.	.
1991 SEP	.002 <T	.	BDL	BDL	.	.
1991 OCT	.002 <T	.	BDL	BDL	.	.
1991 NOV	BDL	.	.003 <T	.002 <T	.	.
1992 JAN	BDL	.	BDL	BDL	.	.
1992 MAY	.006 <T	.	.018	.005 <T	.	.
1992 JUL	.	BDL	BDL	.003 <T	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUBADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
CHEMISTRY (LABORATORY)						
RESIDUE FILTRATE (MG/L)	DET'N LIMIT = N/A			GUIDELINE = 500 (A3)		
1991 JAN	441.000	454.000	.	462.000 CRO	418.000 CRO	408.000 CRO
1991 FEB	542.800	565.000	.	481.000 CRO	413.000 CRO	370.000 CRO
1991 APR	517.000 CRO	404.000 CRO	.	400.000 CRO	385.000 CRO	332.000 CRO
1991 APR	500.000 CRO	314.000 CRO	.	395.000 CRO	350.000 CRO	371.000 CRO
1991 MAY	503.000 CRO	356.000 CRO	.	408.000 CRO	371.000 CRO	395.000 CRO
1991 JUN	436.000	359.000 CRO	.	347.000 CRO	376.000 CRO	378.000 CRO
1991 JUL	11A	371.000 CRO	.	354.000 CRO	399.000 CRO	392.000 CRO
1991 AUG	349.000	424.000 CRO	.	478.000 CRO	436.000 CRO	431.000 CRO
1991 SEP	385.000	495.000 CRO	.	413.000 CRO	424.000 CRO	422.000 CRO
1991 OCT	321.000	461.000 CRO	.	485.000 CRO	429.000 CRO	448.000 CRO
1991 NOV	383.000	406.000 CRO	.	427.000 CRO	334.000 CRO	329.000 CRO
1992 JAN	518.000	424.000 CRO	.	441.000 CRO	520.000 CRO	492.000 CRO
1992 MAY	564.000	351.000 CRO	.	342.000 CRO		
1992 JUL	.	468.000 CRO	421.000 CRO	456.000 CRO		
SULPHATE (MG/L)						
DET'N LIMIT = 0.20						
GUIDELINE = 500 (A3)						
1991 JAN	24.940	50.620	.	54.440	54.530	57.480
1991 FEB	22.790	49.610	.	38.670	54.430	60.690
1991 APR	27.310	71.980	.	52.820	57.480	60.340
1991 APR	28.830	72.690	.	48.660	56.940	50.780
1991 MAY	29.300	77.170	.	45.810	52.070	54.510
1991 JUN	33.690	78.440	.	57.250	59.010	58.090
1991 JUL	32.380	80.660	.	61.330	57.710	58.040
1991 AUG	30.190	70.470	.	44.660	59.880	54.240
1991 SEP	25.200	64.190	.	57.080	56.880	57.960
1991 OCT	23.490	46.300	.	45.900	61.100	57.080
1991 NOV	33.980	60.620	.	58.680	56.840	59.740
1992 JAN	41.290	63.230	.	59.940	54.240	74.740
1992 MAY	22.630	86.990	.	62.700	72.650	
1992 JUL	.	61.230	54.300	60.280	46.650	54.220

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
CHEMISTRY (LABORATORY)						
TURBIDITY (FTU)						
1991 JAN	.530	.440	.460	5.700 RRV	.180 <T	.830
1991 FEB	.710	.540	.530	.260	.280	.370
1991 APR	.780	.530	.460	.190 <T	.260	.530
1991 APR	.740	.720	.080	.710	.540	.460
1991 MAY	1.130	.290	.630	.290	.130	.150
1991 JUN	.650	.230	.600	.250	.290	.300
1991 JUL	.490	.310	.240 <T	.270	.190	.200
1991 AUG	.770	.340	.420	.270	.270	.270
1991 SEP	.860	.230 <T	.260	.370	.250	.310
1991 OCT	.490	1.470 USD	.270	.270	.350	.520
1991 NOV	.400	1.770 USD	.260	.270	.400	.260
1992 JAN	1.180	5.100 USD	1.770 USD	4.500 USD	.240 <T	.630
1992 MAY					.590 USD	.400 USD
1992 JUL						

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WABLER DR FREE FLOW	DIST. SYSTEM WABLER DR STANDING
METALS						
SILVER (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = N/A		
1991 JAN	BDL	BDL	BDL	BDL	BDL	BDL
1991 FEB	BDL	BDL	BDL	BDL	BDL	BDL
1991 APR	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUN	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL
1991 AUG	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL
1991 OCT	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL	BDL
1992 JAN	BDL	BDL	BDL	BDL	BDL	BDL
1992 MAY	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUL	BDL	BDL	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)						
		DET'N LIMIT = 0.10		GUIDELINE = 100 (A4)		
1991 JAN	1.300	1.400	17.000	1.500	3.000	3.000
1991 FEB	1.900	2.500	2.100	2.000	3.800	3.800
1991 APR	2.400	2.600	2.400	2.100	3.500	3.500
1991 MAY	2.800	2.500	2.400	2.400	2.300	2.300
1991 JUN	2.300	2.200	2.200	1.900	3.400	3.400
1991 JUL	2.700	4.100	2.600	3.900	2.500	2.500
1991 AUG	13.000	2.100	2.400	1.800	1.900	1.900
1991 SEP	1.600	1.600	2.000	2.300	.960 <T	.960 <T
1991 OCT	1.900	1.800	2.200	1.700	2.400	2.400
1991 NOV	3.200	1.600	2.000	1.800	2.300	2.300
1992 JAN	3.500	1.000 <T	1.500	1.300	1.700	1.700
1992 MAY	3.600	3.400	3.700	3.200	4.200	4.200
1992 JUL		3.100	3.100	3.700	4.300	4.300

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUPADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
METALS						
ARSENIC (UG/L)						
1991 JAN	1.500	1.500		1.100	.750 <T	
1991 FEB	.470 <T	.330 <T		.530 <T	.310 <T	.170 <T
1991 APR	BDL	BDL		BDL	BDL	BDL
1991 APR	BDL	.140 <T		BDL	.230 <T	BDL
1991 MAY	BDL	BDL		BDL	BDL	BDL
1991 JUN	.440 <T	.280 <T		.270 <T	.150 <T	.290 <T
1991 JUL	.130 <T	.210 <T		.170 <T	.300 <T	.220 <T
1991 AUG	.110 <T	.150 <T		.150 <T	.220 <T	.170 <T
1991 SEP	.580 <T	BDL		.180 <T	.160 <T	.170 <T
1991 OCT	.450 <T	.270 <T		.630 <T	.330 <T	.320 <T
1991 NOV	.500 <T	BDL		BDL	BDL	BDL
1992 JAN		.270 <T		.430 <T	.320 <T	.400 <T
1992 MAY		.240 <T		.250 <T	.120 <T	.370 <T
1992 JUL		.420 <T	.130 <T	.290 <T	.470 <T	.610 <T
BARIIUM (UG/L)						
1991 JAN	43.000	48.000		56.000	30.000	
1991 FEB	42.000	48.000		38.000	30.000	30.000
1991 APR	43.000	35.000		31.000	29.000	28.000
1991 APR	43.000	25.000		31.000	26.000	25.000
1991 MAY	45.000	31.000		34.000	29.000	29.000
1991 JUN	47.000	29.000		24.000	28.000	29.000
1991 JUL	42.000	27.000		28.000	25.000	26.000
1991 AUG	44.000	33.000		37.000	28.000	27.000
1991 SEP	48.000	39.000		30.000	31.000	31.000
1991 OCT	48.000	34.000		37.000	28.000	28.000
1991 NOV	40.000	31.000		28.000	32.000	30.000
1992 JAN	52.000	37.000		39.000	41.000	40.000
1992 MAY	52.000	29.000		23.000	25.000	27.000
1992 JUL		48.000	29.000	37.000	44.000	39.000

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

METALS								
BORON (UG/L)		WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
		DET'N LIMIT = 2.00			GUIDELINE = 5000 (A1)			
1991 JAN	41.000	.	29.000	.	23.000*	15.000 <T	18.000 <T	
1991 FEB	28.000	.	15.000 <T	.	38.000	12.000 <T	31.000	
1991 APR	60.000	.	18.000 <T	.	37.000	28.000	56.000	
1991 APR	51.000	.	15.000 <T	.	16.000 <T	25.000	9.400 <T	
1991 MAY	21.000	.	9.200 <T	.	12.000 <T	8.000 <T	16.000 <T	
1991 JUN	32.000	.	12.000 <T	.	12.000 <T	13.000 <T	12.000 <T	
1991 JUL	21.000	.	9.500 <T	.	12.000 <T	10.000 <T	15.000 <T	
1991 AUG	25.000	.	14.000 <T	.	21.000	14.000 <T	36.000	
1991 SEP	35.000	.	20.000 <T	.	19.000 <T	30.000	20.000 <T	
1991 OCT	66.000	.	15.000 <T	.	48.000	17.000 <T	13.000 <T	
1991 NOV	22.000	.	11.000 <T	.	12.000 <T	12.000 <T	14.000 <T	
1992 JAN	21.000	.	12.000 <T	.	14.000 <T	15.000 <T	9.300 <T	
1992 MAY	32.000	.	11.000 <T	.	9.800 <T	8.300 <T	17.000 <T	
1992 JUL	.	27.000	20.000 <T	29.000	14.000 <T	21.000		
BERYLLIUM (UG/L)								
		DET'N LIMIT = 0.05			GUIDELINE = 6800 (04)			
1991 JAN	BDL	.	BDL	.	BDL	BDL	BDL	
1991 FEB	BDL	.	BDL	.	BDL	BDL	BDL	
1991 APR	.100 <T	.	BDL	.	BDL	BDL	BDL	
1991 APR	.080 <T	.	BDL	.	BDL	BDL	BDL	
1991 MAY	BDL	.	BDL	.	BDL	BDL	BDL	
1991 JUN	BDL	.	BDL	.	BDL	BDL	BDL	
1991 JUL	BDL	.	BDL	.	BDL	BDL	BDL	
1991 AUG	BDL	.	BDL	.	BDL	BDL	BDL	
1991 SEP	.070 <T	.	BDL	.	BDL	BDL	BDL	
1991 OCT	.060 <T	.	BDL	.	BDL	BDL	BDL	
1991 NOV	BDL	.	BDL	.	BDL	BDL	BDL	
1992 JAN	BDL	.	BDL	.	BDL	BDL	BDL	
1992 MAY	BDL	.	BDL	.	BDL	BDL	BDL	
1992 JUL	.	BDL	BDL	BDL	BDL	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
METALS						
CADMIUM (UG/L)	DET'N LIMIT = 0.05			GUIDELINE = 5.0 (A1)		
1991 JAN	BDL	BDL	.	.540	BDL	.
1991 FEB	BDL	BDL	.	.110 <T	BDL	BDL
1991 APR	BDL	BDL	.	BDL	BDL	.110 <T
1991 APR	BDL	BDL	.	BDL	BDL	BDL
1991 MAY	BDL	BDL	.	.090 <T	BDL	BDL
1991 JUN	BDL	BDL	.	BDL	.060 <T	.080 <T
1991 JUL	BDL	BDL	.	BDL	BDL	BDL
1991 AUG	BDL	BDL	.	BDL	BDL	BDL
1991 SEP	BDL	BDL	.	BDL	BDL	BDL
1991 OCT	BDL	BDL	.	BDL	BDL	BDL
1991 NOV	BDL	.100 <T	.	.070 <T	.110 <T	BDL
1992 JAN	BDL	BDL	.	BDL	BDL	BDL
1992 MAY	BDL	BDL	.	BDL	BDL	.080 <T
1992 JUL	BDL	BDL	BDL	BDL	BDL	.080 <T
COBALT (UG/L)						
DET'N LIMIT = 0.02			GUIDELINE = N/A			
1991 JAN	8.200	8.100	.	7.100	6.200	.
1991 FEB	.170 <T	.120 <T	.	.120 <T	.150 <T	.180 <T
1991 APR	.220 <T	.060 <T	.	.140 <T	.030 <T	.110 <T
1991 APR	.190 <T	.060 <T	.	.170 <T	.080 <T	.130 <T
1991 MAY	.320 <T	BDL	.	BDL	BDL	.100 <T
1991 JUN	.530 <T	.250 <T	.	.260 <T	.290 <T	.350 <T
1991 JUL	.250 <T	BDL	.	.030 <T	BDL	BDL
1991 AUG	.400 <T	.080 <T	.	.220 <T	.100 <T	.170 <T
1991 SEP	.570 <T	.130 <T	.	.170 <T	.180 <T	.110 <T
1991 OCT	.330 <T	.050 <T	.	.070 <T	.070 <T	.040 <T
1991 NOV	BDL	BDL	.	BDL	BDL	BDL
1992 JAN	.080 <T	.210 <T	.	.170 <T	.190 <T	.170 <T
1992 MAY	.550 <T	.120 <T	.	.250 <T	.030 <T	.200 <T
1992 JUL	.	.500 <T	.340 <T	.420 <T	.510 <T	.510 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WABBLER DR FREE FLOW	DIST. SYSTEM WABBLER DR STANDING
METALS						
CHROMIUM (UG/L)						
DET'N LIMIT = 0.50 GUIDELINE = 50.0 (A1)						
1991 JAN	12.000	11.000	.	8.400	3.700 <T	.
1991 FEB	.710 <T	BDL	.	6.100	.680 <T	2.600 <T
1991 APR	10.000	2.200 <T	.	7.000	5.100	6.100
1991 APR	10.000	2.600 <T	.	1.300 <T	5.000 <T	5.500
1991 MAY	1.500 <T	1.100 <T	.	1.200 <T	.720 <T	.950 <T
1991 JUN	5.800	2.300 <T	.	2.400 <T	2.400 <T	3.000 <T
1991 JUL	.520 <T	BDL	.	BDL	BDL	BDL
1991 AUG	2.000 <T	3.100 <T	.	3.500 <T	2.400 <T	2.900 <T
1991 SEP	4.200 <T	2.600 <T	.	3.000 <T	5.200	5.900
1991 OCT	13.000	1.100 <T	.	9.700	1.600 <T	2.400 <T
1991 NOV	.830 <T	BDL	.	BDL	BDL	BDL
1992 JAN	.570 <T	BDL	.	BDL	BDL	BDL
1992 MAY	.890 <T	BDL	.	BDL	BDL	BDL
1992 JUL	.	1.300 <T	3.000 <T	.700 <T	.680 <T	.690 <T
COPPER (UG/L)						
DET'N LIMIT = 0.50 GUIDELINE = 1000 (A3)						
1991 JAN	1.900 <T	2.400 <T	.	16.000	50.000	.
1991 FEB	1.400 <T	1.700 <T	.	1.500 <T	53.000	560.000
1991 APR	1.800 <T	2.000 <T	.	1.900 <T	71.000	410.000
1991 APR	1.600 <T	1.400 <T	.	1.800 <T	36.000	390.000
1991 MAY	2.400 <T	2.000 <T	.	2.200 <T	91.000	130.000
1991 JUN	1.800 <T	1.900 <T	.	3.100 <T	120.000	1300.000
1991 JUL	2.100 <T	1.700 <T	.	11.000	160.000	680.000
1991 AUG	1.600 <T	1.500 <T	.	1.800 <T	130.000	1200.000
1991 SEP	1.700 <T	2.500 <T	.	2.200 <T	110.000	140.000
1991 OCT	1.800 <T	1.900 <T	.	2.000 <T	130.000	1100.000
1991 NOV	1.900 <T	2.100 <T	.	1.800 <T	140.000	1500.000
1992 JAN	4.100 <T	2.100 <T	.	1.800 <T	93.000	1200.000
1992 MAY	1.300 <T	1.300 <T	.	1.800 <T	62.000	710.000
1992 JUL	.	2.500 <T	2.200 <T	4.400 <T	90.000	340.000

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOOWADGE WELL SUPPLY

WELL 1 RAW		WELL 2 RAW		WELL 3 RAW		WELL 4 RAW		RESERVOIR TREATED		DIST. SYSTEM WABLER OR FREE FLOW		DIST. SYSTEM WABLER OR STANDING	
METALS													
IRON (UG/L)		GUIDELINE = 300 (A3)											
DET'N LIMIT = 6.00													
1991 JAN	50.000 <T	.	.	19.000 <T	.	BDL	.	7.000 <T	.	BDL	.	BDL	.
1991 FEB	75.000	.	.	19.000 <T	.	24.000 <T	.	BDL	.	9.000 <T	.	6.900 <T	.
1991 APR	79.000	.	.	16.000 <T	.	13.000 <T	.	9.000 <T	.	7.900 <T	.	12.000 <T	.
1991 APR	64.000	.	.	23.000 <T	.	22.000 <T	.	14.000 <T	.	19.000 <T	.	19.000 <T	.
1991 MAY	60.000 <T	.	.	36.000 <T	.	19.000 <T	.	7.100 <T	.	6.300 <T	.	12.000 <T	.
1991 JUN	65.000	.	.	8.200 <T	.	43.000 <T	.	BDL	.	BDL	.	7.900 <T	.
1991 JUL	72.000	.	.	22.000 <T	.	26.000 <T	.	13.000 <T	.	13.000 <T	.	13.000 <T	.
1991 AUG	85.000	.	.	9.600 <T	.	7.700 <T	.	10.000 <T	.	10.000 <T	.	BDL	.
1991 SEP	92.000	.	.	37.000 <T	.	30.000 <T	.	17.000 <T	.	17.000 <T	.	14.000 <T	.
1991 OCT	100.000	.	.	49.000 <T	.	15.000 <T	.	31.000 <T	.	31.000 <T	.	34.000 <T	.
1991 NOV	33.000 <T	.	.	23.000 <T	.	BDL	.	22.000 <T	.	22.000 <T	.	15.000 <T	.
1992 JAN	28.000 <T	.	.	BDL	.	23.000 <T	.	BDL	.	BDL	.	24.000 <T	.
1992 MAY	100.000	.	6.600 <T	BDL	.	8.700 <T	.	35.000 <T	.	35.000 <T	.	29.000 <T	.
1992 JUL	.	.	.	BDL	.	BDL	.	BDL	.	BDL	.	BDL	.
MERCURY (UG/L)													
GUIDELINE = 1.0 (A1)													
43 SAMPLES													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BDL													
BD													

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WABLER OR FREE FLOW	DIST. SYSTEM WABLER OR STANDING
METALS						
MOLYBDENUM (UG/L)						
		DET'N LIMIT = 0.05		GUIDELINE = N/A		
1991 JAN	.170 <T	.320 <T		BDL	.670	
1991 FEB	.220 <T	.320 <T		.350 <T	.580	.730
1991 APR	.300 <T	.520		.590	.710	.740
1991 APR	.330 <T	.660		.470 <T	.630	.900
1991 MAY	.190 <T	.490 <T		.420 <T	.500 <T	.490 <T
1991 JUN	.270 <T	.600		.570	.630	.570
1991 JUL	.370 <T	.560		.650	.610	.620
1991 AUG	.300 <T	.520		.360 <T	.500 <T	.590
1991 SEP	.300 <T	.340 <T		.520	.410 <T	.950
1991 OCT	.280 <T	.380 <T		.490 <T	.680	.590
1991 NOV	.220 <T	.740		.630	.650	.660
1992 JAN	.270 <T	.780		.670	.660	.740
1992 MAY	.540	.900		.850	.680	.800
1992 JUL	.200 <T	.480 <T	.700	.430 <T	.410 <T	.450 <T
NICKEL (UG/L)						
		DET'N LIMIT = 0.20		GUIDELINE = 350 (03)		
1991 JAN	28.000	34.000		40.000	25.000	
1991 FEB	BDL	1.300 <T		BDL	.250 <T	1.900 <T
1991 APR	.330 <T	2.200		1.300 <T	1.500 <T	3.200
1991 APR	1.200 <T	1.900 <T		1.300 <T	1.600 <T	3.300
1991 MAY	BDL	BDL		BDL	BDL	BDL
1991 JUN	BDL	.450 <T		BDL	.400 <T	.800 <T
1991 JUL	BDL	BDL		BDL	BDL	BDL
1991 AUG	1.700 <T	.780 <T		.970 <T	.950 <T	1.500 <T
1991 SEP	2.400	2.200		1.600 <T	1.300 <T	1.400 <T
1991 OCT	.790 <T	1.300 <T		.490 <T	.430 <T	1.600 <T
1991 NOV	BDL	BDL		BDL	BDL	BDL
1992 JAN	BDL	BDL		BDL	.990 <T	BDL
1992 MAY	.820 <T	BDL		BDL	BDL	1.600 <T
1992 JUL	.780 <T	1.400 <T	.630 <T	1.200 <T	1.800 <T	2.000 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WABLER OR FREE FLOW	DIST. SYSTEM WABLER OR STANDING
LEAD (UG/L)						
METALS						
DET'N LIMIT = 0.05						
GUIDELINE = 10 (A1)						
1991 JAN	BDL	.090 <T	.090 <T	BDL	.340 <T	.
1991 FEB	BDL	BDL	BDL	BDL	.270 <T	2.000
1991 APR	BDL	.060 <T	.060 <T	BDL	.250 <T	1.900
1991 APR	BDL	.170 <T	.170 <T	.090 <T	.470 <T	3.300
1991 MAY	BDL	.090 <T	.090 <T	.070 <T	.550	.570
1991 JUN	BDL	BDL	BDL	.080 <T	.610	1.600
1991 JUL	.070 <T	.060 <T	.060 <T	2.000	.480 <T	1.700
1991 AUG	BDL	BDL	BDL	BDL	.370 <T	1.700
1991 SEP	BDL	.060 <T	.060 <T	.060 <T	.310 <T	.130 <T
1991 OCT	BDL	.100 <T	.100 <T	BDL	.450 <T	1.800
1991 NOV	.120 <T	.110 <T	.110 <T	.070 <T	.270 <T	2.400
1992 JAN	.240 <T	BDL	BDL	BDL	.360 <T	1.400
1992 MAY	BDL	.120 <T	.120 <T	BDL	.190 <T	3.500
1992 JUL	BDL	BDL	BDL	.160 <T	.370 <T	4.500
ANTIMONY (UG/L)						
DET'N LIMIT = 0.05						
GUIDELINE = 146 (D4)						
1991 JAN	.390 <T	.490 <T	.490 <T	.360 <T	.430 <T	.
1991 FEB	.370 <T	.600	.600	.600	.560	.620
1991 APR	.340 <T	.430 <T	.430 <T	.420 <T	.480 <T	.450 <T
1991 APR	.390 <T	.490 <T	.490 <T	.380 <T	.420 <T	.550
1991 MAY	.450 <T	.640	.640	.560	.640	.510
1991 JUN	.690	.720	.720	.510	.650	.720
1991 JUL	.940	.580	.580	.550	.610	.630
1991 AUG	.360 <T	.480 <T	.480 <T	.420 <T	.430 <T	.560
1991 SEP	.470 <T	.470 <T	.470 <T	.400 <T	.470 <T	.520
1991 OCT	.350 <T	.540	.540	.380 <T	.560	.560
1991 NOV	.610	.750	.750	.530	.850	.600
1992 JAN	.500 <T	.770	.770	.390 <T	.440 <T	.550
1992 MAY	.360 <T	.410 <T	.410 <T	.640	.450 <T	.450 <T
1992 JUL	.	.260 <T	.260 <T	.360 <T	.270 <T	.390 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WABBLER DR FREE FLOW	DIST. SYSTEM WABBLER DR STANDING
METALS						
SELENIUM (UG/L)						
DET'N LIMIT = 1.00						
GUIDELINE = 10 (A1)						
1991 JAN	1.300 <T	2.100 <T	1.600 <T	1.800 <T	BDL	BDL
1991 FEB	BDL	1.200 <T	BDL	BDL	BDL	BDL
1991 APR	BDL	BDL	BDL	BDL	BDL	BDL
1991 APR	BDL	BDL	BDL	BDL	BDL	1.300 <T
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUN	BDL	BDL	BDL	BDL	1.200 <T	1.200 <T
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL
1991 AUG	BDL	BDL	1.200 <T	1.300 <T	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL
1991 OCT	BDL	BDL	BDL	BDL	1.500 <T	1.300 <T
1991 NOV	1.700 <T	1.300 <T	1.400 <T	BDL	BDL	2.800 <T
1992 JAN	BDL	BDL	1.100 <T	BDL	1.100 <T	BDL
1992 MAY	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUL	BDL	BDL	BDL	BDL	1.400 <T	BDL
STRONTIUM (UG/L)						
DET'N LIMIT = 0.10						
GUIDELINE = N/A						
1991 JAN	140.000	160.000	120.000	110.000	110.000	100.000
1991 FEB	140.000	140.000	120.000	120.000	100.000	100.000
1991 APR	160.000	120.000	110.000	110.000	92.000	89.000
1991 APR	160.000	91.000	120.000	100.000	100.000	110.000
1991 MAY	160.000	110.000	92.000	100.000	100.000	110.000
1991 JUN	170.000	100.000	100.000	100.000	91.000	92.000
1991 JUL	150.000	100.000	120.000	120.000	100.000	100.000
1991 AUG	150.000	130.000	100.000	110.000	110.000	110.000
1991 SEP	150.000	120.000	120.000	120.000	100.000	100.000
1991 OCT	150.000	120.000	99.000	120.000	120.000	100.000
1991 NOV	130.000	120.000	130.000	130.000	130.000	130.000
1992 JAN	150.000	100.000	96.000	93.000	93.000	93.000
1992 MAY	180.000	120.000	120.000	140.000	140.000	130.000
1992 JUL	140.000	110.000	110.000	110.000	110.000	110.000

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
METALS						
TITANIUM (UG/L)						
		DET'N LIMIT = 0.50		GUIDELINE = N/A		
1991 JAN	47.000		43.000		37.000	
1991 FEB	14.000		13.000	40.000	11.000	11.000
1991 APR	19.000		15.000	12.000	15.000	14.000
1991 APR	25.000		17.000	15.000	17.000	17.000
1991 MAY	42.000		32.000	32.000	32.000	31.000
1991 JUN	15.000		11.000	10.000	11.000	11.000
1991 JUL	9.900		7.700	7.700	7.600	7.200
1991 AUG	2.200 <T		1.800 <T	1.900 <T	1.600 <T	1.600 <T
1991 SEP	2.200 <T		1.900 <T	1.800 <T	2.000 <T	1.800 <T
1991 OCT	9.000		7.200	7.300	6.400	6.500
1991 NOV	11.000		11.000	11.000	11.000	9.900
1992 JAN	6.700		6.100	5.700	6.200	6.200
1992 MAY	33.000		22.000	23.000	21.000	23.000
1992 JUL		22.000	20.000	19.000	22.000	21.000
THALLIUM (UG/L)						
		DET'N LIMIT = 0.05		GUIDELINE = 13 (04)		
1991 JAN	BDL		.070 <T	BDL	BDL	BDL
1991 FEB	BDL		BDL	BDL	BDL	BDL
1991 APR	BDL		BDL	BDL	BDL	BDL
1991 APR	BDL		BDL	BDL	BDL	BDL
1991 MAY	BDL		BDL	BDL	BDL	BDL
1991 JUN	BDL		.070 <T	BDL	BDL	BDL
1991 JUL	BDL		BDL	BDL	BDL	BDL
1991 AUG	BDL		BDL	BDL	BDL	BDL
1991 SEP	BDL		BDL	BDL	BDL	BDL
1991 OCT	BDL		BDL	BDL	BDL	BDL
1991 NOV	BDL		.070 <T	BDL	BDL	BDL
1992 JAN	BDL		BDL	.070 <T	.150 <T	.120 <T
1992 MAY	BDL		BDL	BDL	BDL	BDL
1992 JUL		BDL	.070 <T	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
METALS						
URANIUM (UG/L)						
1991 JAN	.980	2.800	.	2.100	2.000	.
1991 FEB	.920	2.800	.	1.400	1.900	2.000
1991 APR	.890	2.300	.	1.500	1.600	1.800
1991 APR	.940	2.200	.	1.300	1.700	1.700
1991 MAY	.900	2.400	.	1.300	1.500	1.500
1991 JUN	1.000	2.500	.	1.800	1.800	1.700
1991 JUL	.850	2.400	.	1.500	1.600	1.500
1991 AUG	.880	2.400	.	1.200	1.700	1.800
1991 SEP	.870	2.700	.	1.600	1.600	1.800
1991 OCT	.880	2.600	.	1.400	1.500	1.500
1991 NOV	.940	1.600	.	1.900	1.700	1.800
1992 JAN	1.300	2.400	.	2.300	2.300	2.400
1992 MAY	1.000	2.400	.	1.400	2.000	1.900
1992 JUL	.870	2.100	1.700	2.100	1.700	2.000
VANADIUM (UG/L)						
1991 JAN	.720	1.000	.	1.700	.650	.
1991 FEB	.310 <T	.490 <T	.	.340 <T	.340 <T	.360 <T
1991 APR	BDL	.140 <T	.	.130 <T	.060 <T	.100 <T
1991 APR	.200 <T	.350 <T	.	.310 <T	.300 <T	.310 <T
1991 MAY	BDL	.430 <T	.	.190 <T	.260 <T	.270 <T
1991 JUN	BDL	.250 <T	.	.160 <T	.160 <T	.070 <T
1991 JUL	BDL	.070 <T	.	BDL	BDL	BDL
1991 AUG	.240 <T	.310 <T	.	.320 <T	.380 <T	.310 <T
1991 SEP	.200 <T	.390 <T	.	.420 <T	.340 <T	.350 <T
1991 OCT	.160 <T	.330 <T	.	.240 <T	.180 <T	.200 <T
1991 NOV	BDL	.250 <T	.	.150 <T	.200 <T	.120 <T
1992 JAN	.220 <T	.380 <T	.	.380 <T	.330 <T	.320 <T
1992 MAY	.240 <T	.310 <T	.	.310 <T	.310 <T	.360 <T
1992 JUL	.260 <T	.440 <T	.310 <T	.410 <T	.370 <T	.420 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

METALS							
ZINC (UG/L)	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOQUADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
CHLOROAROMATICS						
HEXACHLOROBUTADIENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 450 (D4)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
123-TRICHLOROBENZENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
1234-TETCHLOROBENZENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
1235-TETCHLOROBENZENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
124-TRICHLOROBENZENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 10000 (I)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
1245-TETCHLOROBENZENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 38000 (D4)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
135-TRICHLOROBENZENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
HEXACHLOROBENZENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 10 (C1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
HEXACHLOROETHANE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 1900 (D4)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
OCTACHLOROSTYRENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
PENTACHLOROBENZENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 74000 (D4)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
236-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUPADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
CHLOROAROMATICS						
245-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
26A-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUBADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
PESTICIDES AND PCB						
ALDRIN (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 700 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
ALPHA BHC (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 700 (G)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
BETA BHC (NG/L)		DET'N LIMIT = 1.00		GUIDELINE = 300 (G)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
LINDANE (GAMMA BHC) (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 4000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
ALPHA CHLORDANE (NG/L)		DET'N LIMIT = 2.000		GUIDELINE = 7000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
GAMMA CHLORDANE (NG/L)		DET'N LIMIT = 2.00		GUIDELINE = 7000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
DIELDRIN (NG/L)		DET'N LIMIT = 2.00		GUIDELINE = 700 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
METHOXYCHLOR (NG/L)		DET'N LIMIT = 5.0		GUIDELINE = 900000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
ENDOSULFAN 1 (NG/L)		DET'N LIMIT = 2.00		GUIDELINE = 74000 (D4)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
ENDOSULFAN 11 (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 74000 (D4)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
ENDRIN (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 1600 (D3)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
ENDOSULFAN SULPHATE (NG/L)		DET'N LIMIT = 5.00		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUPADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WABLER DR FREE FLOW	DIST. SYSTEM WABLER DR STANDING
PESTICIDES AND PCB						
HEPTACHLOR EPOXIDE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 3000 (A1)		
27 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
HEPTACHLOR (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 3000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
MIREX (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
OXYCHLORDANE (NG/L)		DET'N LIMIT = 2.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
O,P-DDT (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 30000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
PCB (NG/L)		DET'N LIMIT = 20.00		GUIDELINE = 3000 (A2)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
P,P-DDD (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 30000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
P,P-DDE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 30000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
P,P-DDT (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 30000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
TOXAPHENE (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 5000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
AMETRIINE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = 300000 (D3)		
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
ATRAZINE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = 60000 (A2)		
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WABLER DR FREE FLOW	DIST. SYSTEM WABLER DR STANDING
PESTICIDES AND PCB						
ATRAZONE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = N/A		
28 SAMPLES	BDL	BDL	BDL	BDL		
CYANAZINE (BLADEX) (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = 10000 (A2)		
28 SAMPLES	BDL	BDL	BDL	BDL		
DESETHYL ATRAZINE (NG/L)		DET'N LIMIT = 200.0		GUIDELINE = 60000 (A2)		
28 SAMPLES	BDL	BDL	BDL	BDL		
DESETHYL SIMAZINE (NG/L)		DET'N LIMIT = 200.0		GUIDELINE = 10000 (A2)		
28 SAMPLES	BDL	BDL	BDL	BDL		
PROMETONE (NG/L)		DET'N LIMIT = 50.000		GUIDELINE = 52500 (D3)		
28 SAMPLES	BDL	BDL	BDL	BDL		
PROPACINE (NG/L)		DET'N LIMIT = 50.000		GUIDELINE = 700000 (D3)		
28 SAMPLES	BDL	BDL	BDL	BDL		
PROMETRYNE (NG/L)		DET'N LIMIT = 50.000		GUIDELINE = 1000 (A2)		
28 SAMPLES	BDL	BDL	BDL	BDL		
METRIBUZIN (SENCOR) (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = 80000 (A1)		
28 SAMPLES	BDL	BDL	BDL	BDL		
SIMAZINE (NG/L)		DET'N LIMIT = 50.00		GUIDELINE = 10000 (A2)		
28 SAMPLES	BDL	BDL	BDL	BDL		
ALACHLOR (LASSO) (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 5000 (A2)		
28 SAMPLES	BDL	BDL	BDL	BDL		
METOLACHLOR (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 50000 (A2)		
28 SAMPLES	BDL	BDL	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WABLER DR FREE FLOW	DIST. SYSTEM WABLER DR STANDING
PESTICIDES AND PCB						
HEXACHLOROCYCLOPENTADIEN (NG/L)						
DET'N LIMIT = 5.00						
GUIDELINE = 206000 (D4)						
1991 JAN	BDL	BDL	.	BDL	BDL	.
1991 FEB	BDL	BDL	.	BDL	BDL	.
1991 APR	BDL	BDL	.	6,000 <T	19,000 <T	.
1991 APR	BDL	BDL	.	17,000 <T	26,000 <T	.
1991 MAY	BDL	ILA	.	BDL	ILA	.
1991 JUN	IAW	IAW	.	IAW	IAW	.
1991 JUL	IAW	IAW	.	IAW	IAW	.
1991 AUG	IAW	IAW	.	IAW	IAW	.
1991 SEP	IAW	IAW	.	IAW	IAW	.
1991 OCT	IOU	BDL	.	IOU	BDL	.
1991 NOV	BDL	BDL	.	BDL	BDL	.
1992 JAN	IOU	IOU	.	IOU	IOU	.
1992 MAY	IOU	IOU	.	IOU	IOU	.
1992 JUL	IOU	IOU	IOU	IOU	IOU	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
PHENOLICS						
PHENOLICS (UG/L)						
1991 JAN	.800 <T	.	.600 <T	.	.800 <T	.
1991 FEB	.200 <T	.	BDL	.	BDL	.
1991 APR	BDL	.	BDL	.	BDL	.
1991 APR	BDL	.	BDL	.	BDL	.
1991 MAY	BDL	.	BDL	.	BDL	.
1991 JUN	.200 <T	.	.200 <T	.	.400 <T	.
1991 JUL	BDL	.	.400 <T	.	.400 <T	.
1991 AUG	.200 <T	.	.200 <T	.	.200 <T	.
1991 SEP	1.000	.	1.400	.	1.400	.
1991 OCT	.400 <T	.	.400 <T	.	BDL	.
1991 NOV	BDL	.	BDL	.	BDL	.
1992 JAN	.600 <T	.	.800 <T	.	.400 <T	.
1992 MAY	BDL	.	BDL	.	.400 <T	.
1992 JUL	.	BDL	IRE	BDL	BDL	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
POLYAROMATIC HYDROCARBONS						
PHENANTHRENE (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
ANTHRACENE (NG/L)		DET'N LIMIT = 1.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
FLUORANTHENE (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 42000 (D4)		
20 SAMPLES	BDL	BDL		BDL	BDL	
PYRENE (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
BENZO(A)ANTHRACENE (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
CHRYSENE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
DIMETH. BENZ(A)ANTHR (NG/L)		DET'N LIMIT = 5.0		GUIDELINE = N/A		
16 SAMPLES	BDL	BDL		BDL	BDL	
BENZO(E) PYRENE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
BENZO(B) FLUORANTHENE (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
PERYLENE (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
BENZO(K) FLUORANTHENE (NG/L)		DET'N LIMIT = 1.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
BENZO(A) PYRENE (NG/L)		DET'N LIMIT = 5.0		GUIDELINE = 10 (A1)		
20 SAMPLES	BDL	BDL		BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
POLYAROMATIC HYDROCARBONS						
BENZO(G,H,I) PERYLEN (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
DIBENZO(A,H) ANTHRAC (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
INDENO(1,2,3-C,D) PY (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
BENZO(B) CHRYSENE (NG/L)		DET'N LIMIT = 2.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	
CORONENE (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A		
20 SAMPLES	BDL	BDL		BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
VOLATILES						
BENZENE (UG/L)	DET'N LIMIT = 0.05			GUIDELINE = 5 (A1)		
1991 JAN	BDL	BDL	BDL	BDL	BDL	BDL
1991 FEB	BDL	BDL	BDL	BDL	BDL	BDL
1991 APR	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUN	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL
1991 AUG	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL
1991 OCT	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL	BDL
1992 JAN	BDL	BDL	BDL	BDL	BDL	BDL
1992 MAY	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUL	BDL	BDL	BDL	BDL	BDL	BDL
TOLUENE (UG/L)						
DET'N LIMIT = 0.05			GUIDELINE = 24 (A3)			
1991 JAN	BDL	BDL	BDL	BDL	BDL	BDL
1991 FEB	BDL	BDL	BDL	BDL	BDL	BDL
1991 APR	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUN	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL
1991 AUG	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL
1991 OCT	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL	BDL
1992 JAN	BDL	BDL	BDL	BDL	BDL	BDL
1992 MAY	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUBAJE WELLS SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WABLER DR FREE FLOW	DIST. SYSTEM WABLER DR STANDING
VOLATILES						
ETHYLBENZENE (UG/L)						
		DET'N LIMIT = 0.05		GUIDELINE = 2.4 (A3)		
1991 JAN	BDL	BDL	BDL	BDL	BDL	.
1991 FEB	BDL	.050 <T	.	BDL	BDL	.
1991 APR	.050 <T	.100 <T	.	BDL	BDL	.
1991 APR	.100 <T	BDL	.	BDL	BDL	.
1991 MAY	.050 <T	BDL	.	.100 <T	BDL	.
1991 JUN	BDL	BDL	.	.150 <T	.050 <T	.
1991 JUL	BDL	BDL	.	.150 <T	.100 <T	.
1991 AUG	BDL	BDL	.	BDL	BDL	.
1991 SEP	.100 <T	.100 <T	.	.050 <T	.100 <T	.
1991 OCT	.050 <T	BDL	.	.100 <T	BDL	.
1991 NOV	BDL	.050 <T	.	.050 <T	.150 <T	.
1992 JAN	BDL	BDL	.	.050 <T	BDL	.
1992 MAY	.150 <T	.100 <T	.	.100 <T	.100 <T	.
1992 JUL	.	.150 <T	.150 <T	.100 <T	.100 <T	.
P-XYLENE (UG/L)						
		DET'N LIMIT = 0.10		GUIDELINE = 300 (A3*)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	.
M-XYLENE (UG/L)						
		DET'N LIMIT = 0.10		GUIDELINE = 300 (A3*)		
1991 JAN	BDL	BDL	BDL	BDL	BDL	.
1991 FEB	BDL	BDL	.	BDL	BDL	.
1991 APR	BDL	BDL	.	BDL	BDL	.
1991 APR	BDL	BDL	.	BDL	BDL	.
1991 MAY	BDL	BDL	.	.300 <T	BDL	.
1991 JUN	BDL	BDL	.	BDL	BDL	.
1991 JUL	BDL	BDL	.	BDL	BDL	.
1991 AUG	BDL	BDL	.	BDL	BDL	.
1991 SEP	BDL	BDL	.	BDL	BDL	.
1991 OCT	BDL	BDL	.	BDL	BDL	.
1991 NOV	BDL	BDL	.	BDL	BDL	.
1992 JAN	BDL	BDL	.	BDL	BDL	.
1992 MAY	BDL	BDL	.	BDL	BDL	.
1992 JUL	.	BDL	BDL	BDL	BDL	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WABLER DR FREE FLOW	DIST. SYSTEM WABLER DR STANDING
VOLATILES						
O-XYLENE (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)	
1991 JAN	BDL				BDL	BDL
1991 FEB	BDL				BDL	BDL
1991 APR	BDL				BDL	BDL
1991 APR	BDL				BDL	BDL
1991 MAY	BDL				.150 <T	BDL
1991 JUN	BDL				.050 <T	BDL
1991 JUL	BDL				BDL	BDL
1991 AUG	BDL				BDL	BDL
1991 SEP	BDL				BDL	BDL
1991 OCT	BDL				BDL	BDL
1991 NOV	BDL				BDL	BDL
1992 JAN	BDL				BDL	BDL
1992 MAY	BDL				BDL	BDL
1992 JUL		BDL	BDL		BDL	BDL
STYRENE (UG/L)						
				DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)	
1991 JAN	BDL				BDL	BDL
1991 FEB	BDL				BDL	BDL
1991 APR	.100 <T				.050 <T	.100 <T
1991 APR	.100 <T				.100 <T	BDL
1991 MAY	.050 <T				BDL	BDL
1991 JUN	BDL				.250 <T	BDL
1991 JUL	BDL				.200 <T	.050 <T
1991 AUG	BDL				BDL	BDL
1991 SEP	.150 <T				.100 <T	.200 <T
1991 OCT	.050 <T				.100 <T	BDL
1991 NOV	.100 <T				.150 <T	.300 <T
1992 JAN	.100 <T				.100 <T	.100 <T
1992 MAY	.350 <T				.250 <T	.100 <T
1992 JUL		.200 <T	.250 <T		.200 <T	.200 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
VOLATILES						
1,1-DICHLOROETHYLENE (UG/L)						
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
DET'N LIMIT = 0.100						
GUIDELINE = 7 (D1)						
METHYLENE CHLORIDE (UG/L)						
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
DET'N LIMIT = 0.50						
GUIDELINE = 50 (A1)						
1991 JAN	BDL	BDL	BDL	BDL	BDL	BDL
1991 FEB	BDL	BDL	BDL	BDL	BDL	BDL
1991 APR	BDL	BDL	BDL	BDL	BDL	BDL
1991 APR	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUN	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL
1991 AUG	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL
1991 OCT	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL	BDL
1992 JAN	BDL	BDL	BDL	BDL	BDL	BDL
1992 MAY	1.500 UCS	2.500 UCS	BDL	3.500 UCS	7.500 UCS	BDL
1992 JUL	BDL	BDL	BDL	BDL	BDL	BDL
T12-DICHLOROETHYLENE (UG/L)						
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
DET'N LIMIT = 0.10						
GUIDELINE = 70 (D1)						
1,1-DICHLOROETHANE (UG/L)						
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
DET'N LIMIT = 0.100						
GUIDELINE = N/A						
CHLOROFORM (UG/L)						
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
DET'N LIMIT = 0.10						
GUIDELINE = 350 (A1+)						
1991 JAN	BDL	BDL	BDL	3.100	4.700	BDL
1991 FEB	BDL	BDL	BDL	2.800	4.700	BDL
1991 APR	.200 <T	BDL	BDL	9.000	16.500	BDL
1991 APR	.200 <T	BDL	BDL	10.700	20.800	BDL
1991 MAY	.300 <T	BDL	BDL	7.900	14.300	BDL
1991 JUN	.200 <T	BDL	BDL	36.400	17.900	BDL
1991 JUL	.200 <T	BDL	BDL	30.500	21.100	BDL
1991 AUG	.200 <T	BDL	BDL	4.000	15.300	BDL
1991 SEP	BDL	BDL	BDL	27.300	20.700	BDL
1991 OCT	BDL	BDL	BDL	36.900	33.200	BDL
1991 NOV	.200 <T	.200 <T	.200 <T	.200 <T	.300 <T	BDL
1992 JAN	.300 <T	BDL	BDL	28.100	14.800	BDL
1992 MAY	.200 <T	BDL	BDL	1.300	1.100	BDL
1992 JUL	1.700	.400 <T	.500 <T	15.700	13.100	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
VOLATILES						
111, TRICHLOROETHANE (UG/L)						
		DET'N LIMIT = 0.02		GUIDELINE = 200 (D1)		
1991 JAN	.340	.060 <T	.040 <T	BDL	BDL	.
1991 FEB	.100 <T	.060 <T	.040 <T	.040 <T	BDL	.
1991 APR	.060 <T	.040 <T	.040 <T	BDL	BDL	.
1991 MAY	.100 <T	.060 <T	.040 <T	BDL	BDL	.
1991 JUN	.120 <T	BDL	BDL	BDL	BDL	.
1991 JUL	.100 <T	BDL	BDL	BDL	BDL	.
1991 AUG	.100 <T	BDL	.040 <T	BDL	BDL	.
1991 SEP	.100 <T	BDL	BDL	BDL	BDL	.
1991 OCT	.100 <T	BDL	BDL	BDL	BDL	.
1991 NOV	.140 <T	.040 <T	BDL	BDL	BDL	.
1992 JAN	.460	BDL	BDL	BDL	BDL	.
1992 MAY	BDL	BDL	BDL	BDL	BDL	.
1992 JUL	.080 <T	BDL	BDL	BDL	BDL	.
1,2-DICHLOROETHANE (UG/L)						
		DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	.
CARBON TETRACHLORIDE (UG/L)						
		DET'N LIMIT = 0.20		GUIDELINE = 5 (A1)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	.
1,2-DICHLOROPROPANE (UG/L)						
		DET'N LIMIT = 0.05		GUIDELINE = 5 (D1)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	.
TRICHLOROETHYLENE (UG/L)						
		DET'N LIMIT = 0.10		GUIDELINE = 50 (A1)		
1991 JAN	BDL	BDL	BDL	BDL	BDL	.
1991 FEB	BDL	.100 <T	BDL	BDL	BDL	.
1991 APR	BDL	.100 <T	BDL	BDL	BDL	.
1991 MAY	BDL	.100 <T	BDL	BDL	BDL	.
1991 JUN	BDL	.100 <T	BDL	BDL	BDL	.
1991 JUL	BDL	.100 <T	BDL	BDL	BDL	.
1991 AUG	BDL	.100 <T	BDL	BDL	BDL	.
1991 SEP	BDL	.200 <T	BDL	BDL	BDL	.
1991 OCT	BDL	.200 <T	BDL	BDL	BDL	.
1991 NOV	BDL	BDL	BDL	BDL	BDL	.
1992 JAN	BDL	BDL	BDL	BDL	BDL	.
1992 MAY	BDL	BDL	BDL	BDL	BDL	.
1992 JUL	BDL	BDL	BDL	BDL	BDL	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
VOLATILES						
DICHLOROBROMOMETHANE (UG/L)						
		DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)		
1991 JAN	BDL	.	BDL	1.900	1.850	.
1991 FEB	BDL	.	BDL	2.000	1.900	.
1991 APR	BDL	.	BDL	3.000	4.150	.
1991 APR	BDL	.	BDL	3.450	3.800	.
1991 MAY	.100 <T	.	BDL	3.300	3.650	.
1991 JUN	BDL	.	BDL	5.150	3.400	.
1991 JUL	BDL	.	BDL	5.200	3.800	.
1991 AUG	BDL	.	BDL	1.600	4.250	.
1991 SEP	BDL	.	BDL	8.200	5.900	.
1991 OCT	BDL	.	BDL	9.700	7.700	.
1991 NOV	BDL	.	BDL	BDL	BDL	.
1992 JAN	BDL	.	BDL	12.500	7.700	.
1992 MAY	BDL	.	BDL	BDL	BDL	.
1992 JUL	.300 <T	.	BDL	6.000	5.800	.
112-TRICHLOROETHANE (UG/L)						
		DET'N LIMIT = 0.05		GUIDELINE = 0.6 (D4)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	.
CHLORODIBROMOMETHANE (UG/L)						
		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)		
1991 JAN	BDL	.	BDL	.800 <T	BDL	.
1991 FEB	BDL	.	BDL	.900 <T	.400 <T	.
1991 APR	BDL	.	BDL	.600 <T	.700 <T	.
1991 APR	BDL	.	BDL	.800 <T	.800 <T	.
1991 MAY	BDL	.	BDL	1.000 <T	.800 <T	.
1991 JUN	BDL	.	BDL	.500 <T	.400 <T	.
1991 JUL	BDL	.	BDL	.400 <T	.500 <T	.
1991 AUG	BDL	.	BDL	.300 <T	.700 <T	.
1991 SEP	BDL	.	BDL	1.400	.900 <T	.
1991 OCT	BDL	.	BDL	1.500	1.100	.
1991 NOV	BDL	.	BDL	BDL	BDL	.
1992 JAN	BDL	.	BDL	2.500	2.100	.
1992 MAY	BDL	.	BDL	BDL	BDL	.
1992 JUL	BDL	BDL	BDL	1.200	1.900	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUBADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM FREE FLOW	DIST. SYSTEM WABLER OR STANDING
VOLATILES						
TETRACHLOROETHYLENE (UG/L)						
			DET'N LIMIT = 0.05	GUIDELINE = 65 (A5)		
1991 JAN	BDL	.	3.900	.900	.400 <T	.
1991 FEB	BDL	.	3.750	.200 <T	.400 <T	.
1991 APR	.050 <T	.	5.250	.250 <T	.300 <T	.
1991 APR	BDL	.	3.750	.100 <T	.150 <T	.
1991 MAY	BDL	.	3.950	.150 <T	.150 <T	.
1991 JUN	BDL	.	2.600	.200 <T	.250 <T	.
1991 JUL	BDL	.	3.250	.200 <T	.150 <T	.
1991 AUG	BDL	.	3.400	.100 <T	.500	.
1991 SEP	BDL	.	5.400	.300 <T	.400 <T	.
1991 OCT	BDL	.	4.500	.300 <T	.300 <T	.
1991 NOV	BDL	.	.650	.350 <T	.400 <T	.
1992 JAN	BDL	.	.750	.200 <T	.200 <T	.
1992 MAY	BDL	.	1.500	BDL	.400 <T	.
1992 JUL	BDL	.	.900	.100 <T	.250 <T	.
BROMOFORM (UG/L)						
			DET'N LIMIT = 0.20	GUIDELINE = 350 (A1+)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	.
1122-TETRACHLOROETHANE (UG/L)						
			DET'N LIMIT = 0.05	GUIDELINE = 0.17 (D4)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	.
VINYL CHLORIDE (UG/L)						
			DET'N LIMIT = 0.100	GUIDELINE = 2 (D1)		
9 SAMPLES	BDL	BDL	BDL	BDL	BDL	.
C12-DICHLOROETHYLENE (UG/L)						
			DET'N LIMIT = 0.100	GUIDELINE = 70 (D1)		
9 SAMPLES	BDL	BDL	BDL	BDL	BDL	.
CHLOROBENZENE (UG/L)						
			DET'N LIMIT = 0.10	GUIDELINE = 1510 (D3)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
VOLATILES						
1,4-DICHLOROBENZENE (UG/L)						
		DET'N LIMIT = 0.10		GUIDELINE = 5 (A1)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
1,3-DICHLOROBENZENE (UG/L)						
		DET'N LIMIT = 0.10		GUIDELINE = 3750 (D3)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
1,2-DICHLOROBENZENE (UG/L)						
		DET'N LIMIT = 0.05		GUIDELINE = 200 (A1)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
ETHYLENE DIBROMIDE (UG/L)						
		DET'N LIMIT = 0.05		GUIDELINE = 50 (D1)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
TOTAL TRIHALOMETHANES (UG/L)						
		DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)		
1991 JAN	BDL	BDL	BDL	5.700	6.600	
1991 FEB	BDL	BDL	BDL	5.700	6.950	
1991 APR	BDL	BDL	BDL	12.600	21.300	
1991 APR	BDL	BDL	BDL	14.900	25.450	
1991 MAY	BDL	BDL	BDL	12.250	18.800	
1991 JUN	BDL	BDL	BDL	42.050	21.700	
1991 JUL	BDL	BDL	BDL	36.100	25.400	
1991 AUG	BDL	BDL	BDL	5.900	20.250	
1991 SEP	BDL	BDL	BDL	36.900	27.500	
1991 OCT	BDL	BDL	BDL	48.100	42.000	
1991 NOV	BDL	BDL	BDL	BDL	BDL	
1992 JAN	BDL	BDL	BDL	43.100	24.600	
1992 MAY	BDL	BDL	BDL	1.300 <T	1.050 <T	
1992 JUL	BDL	BDL	BDL	22.900	20.800	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOWADGE WELL SUPPLY

WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
RADIONUCLIDES						
COBALT 60 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = N/A		
6 SAMPLES	BDL	BDL		BDL		
CESIUM 134 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = N/A		
6 SAMPLES	BDL	BDL		BDL		
CESIUM 137 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = 50 (A1)		
6 SAMPLES	BDL	BDL		BDL		
GROSS ALPHA COUNT (BQ/L)		DET'N LIMIT = 0.04		GUIDELINE = 0.55 (D1)		
1991 MAY	BDL	.050		BDL		
1992 JAN	.090	.100		.090		
GROSS BETA COUNT (BQ/L)		DET'N LIMIT = 0.04		GUIDELINE = N/A		
1991 MAY	.100	.110		.090		
1992 JAN	.100	.090		.080		
TRITIUM (BQ/L)		DET'N LIMIT = 7.00		GUIDELINE = 40000 (A1)		
1991 MAY	11.000	12.000		BDL		
1992 JAN	BDL	BDL		BDL		
IODINE 131 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = 10 (A1)		
6 SAMPLES	BDL	BDL		BDL		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER -----	UNIT ----	DETECTION LIMIT -----	GUIDELINE -----
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A4)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.20	30-500 (A4)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.20	100.0 (F2)
CHLORIDE	MG/L	0.20	250.0 (A3)
COLOUR	TCU	0.50	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.00	400.0 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.10	5.0 (A3)
FLUORIDE	MG/L	0.01	1.5* (A1)
HARDNESS	MG/L	0.50	80-100 (A4)
IONCAL	DMNSLESS	N/A	N/A
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.10	30.0 (F2)
NITRATES (TOTAL)	MG/L	0.005	10.0 (A1)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
POTASSIUM	MG/L	0.010	10.0 (F2)
RESIDUE FILTRATE (CALCULATED TDS)	MG/L	N/A	500.0 (A3)
SODIUM	MG/L	0.20	200.0 (A4)
SULPHATE	MG/L	0.20	500.0 (A4)
TURBIDITY	FTU	0.05	1.0 (A1)

* The Maximum Acceptable Concentration (MAC) for naturally occurring fluoride in drinking water is 2.4 mg/L.

CHLOROAROMATICS			
1,2,3-TRICHLOROBENZENE	NG/L	5.0	N/A
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,4-TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.0	N/A
2,3,6-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,4,5-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,6A-TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE (HCB)	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
2,3,4-TRICHLOROPHENOL	NG/L	100.0	N/A
2,3,4,5-TETRACHLOROPHENOL	NG/L	20.0	N/A
2,3,5,6-TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
2,4,5-TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
2,4,6-TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	N/A
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
POLYNUCLEAR AROMATIC HYDROCARBONS			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRAZONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DESETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADAX)	NG/L	100.0	10000 (A2)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
-----	----	-----	-----
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	30000 (A1)
O,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDE	NG/L	1.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
DESETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	N/A
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.0	N/A
2,4,5-TRICHLOROPHOXY ACETIC ACID	NG/L	50.0	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.0	100000 (A1)
2,4-DICHLOROPHOXYBUTYRIC ACID (2,4-DB)	NG/L	200.0	N/A
2,4,5-TP (SILVEX)	NG/L	20.0	10000 (A1)
BUTYLATE (SUTAN)	NG/L	2000.0	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.0	90000 (A1)
CARBOFURAN	NG/L	2000.0	90000 (A1)
CHLORPROPHAM (CIPC)	NG/L	2000.0	350000 (G)
CHLORPYRIFOS (DURSBAN)	NG/L	20.0	N/A
DIALLATE	NG/L	2000.0	N/A
DIAZINON	NG/L	20.0	20000 (A1)
DICAMBA	NG/L	50.0	120000 (A1)
DICHLOROVOS	NG/L	20.0	N/A
EPTAM	NG/L	2000.0	N/A
ETHION	NG/L	20.0	35000 (G)
IPC	NG/L	2000.0	N/A
MALATHION	NG/L	20.0	190000 (A1)
METHYL PARATHION	NG/L	50.0	9000 (D3)
METHYLTRITHION	NG/L	20.0	N/A
MEVINPHOS	NG/L	20.0	N/A
PARATHION	NG/L	20.0	50000 (A1)
PHORATE (THIMET)	NG/L	20.0	2000 (A2)
PICHLORAM	NG/L	100.0	190000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.0	140000 (D3)
RELDAN	NG/L	20.0	N/A
RONNEL	NG/L	20.0	N/A
VOLATILES			
1,1-DICHLOROETHANE	UG/L	0.10	N/A
1,1-DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2-DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2-DICHLOROETHANE	UG/L	0.05	5 (A1)
1,2-DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3-DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4-DICHLOROBENZENE	UG/L	0.10	5 (A1)
1,1,1-TRICHLOROETHANE	UG/L	0.02	200 (D1)
1,1,2-TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1,1,2,2-TETRACHLOROETHANE	UG/L	0.05	0.17 (D4)

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
CIS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	65 (A5)
TRANS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)
VINYL CHLORIDE	UG/L	0.10	2 (D1)
RADIONUCLIDES			
TRITIUM	BQ/L	7.0	40000 (A1)
GROSS ALPHA COUNT	BQ/L	0.04	0.55# (D1)
GROSS BETA COUNT	BQ/L	0.04	N/A
COBALT 60	BQ/L	0.70	N/A
CESIUM 134	BQ/L	0.70	N/A
CESIUM 137	BQ/L	0.70	50 (A1)
IODINE 131	BQ/L	0.70	10 (A1)

Equal to 15.0 Picocuries/litre

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1992, 109 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment and Energy (MOEE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOEE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOEE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOEE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOEE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOEE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOEE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

PARAMETER REFERENCE INFORMATION

NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 $\mu g/L$

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27)
CYCLOHEXATRIENE (41)

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NONPOLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30)

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41)
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39)
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80)

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES: MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27)
BOILING POINT: 80.1°C (27)
SPECIFIC GRAVITY: 0.8790 AT 20°C (27)
VAPOUR PRESSURE: 100 MM AT 26.1°C (27)
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41)
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39)
CARBON ADSORPTION: $K=1.0$; $1/N=1.6$; $R=0.97$; $PH=5.3$ (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC), (OWTRI)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Specific Pesticides (OWCP), (PEOP), (PECAR)	-as per Organics -three extra bottles must be filled
Polyaromatic hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate
Cyanide (Treated only)	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)

Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year) (PBVOL), (PBEXT)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.
6. No smoking in area of sample location.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.

5. Fill general chemistry and metals bottles.

6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (Caution: HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Polyaromatic Hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

